Instruction Manual
IM-106-880 Original Issue
February 2005

OCX 8800
Oxygen/Combustibles Transmitter

General Purpose OCX 8800 Oxygen/Combustibles Analyzer with Remote Electronics

ROSEMOUNT® Analytical

http://www.raihome.com

EMERSON™ Process Management

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OCX 8800
Oxygen/Combustibles Transmitter

ESSENTIAL INSTRUCTIONS

READ THIS PAGE BEFORE PROCEEDING!

Rosemount Analytical designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you **MUST properly install, use, and maintain them** to ensure they continue to operate within their normal specifications. The following instructions **MUST be adhered to** and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- **Read all instructions** prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, **contact your Rosemount Analytical representative** for clarification.
- **Follow all warnings, cautions, and instructions** marked on and supplied with the product.
- **Inform and educate your personnel in the proper installation, operation, and maintenance of the product**.
- **Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes.** Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, **use qualified personnel** to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Rosemount. Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, **and VOID YOUR WARRANTY**. Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- **Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.**

The information contained in this document is subject to change without notice.

⚠CAUTION

If a Model 275/375 Universal HART® Communicator is used with this unit, the software within the Model 275/375 may require modification. If a software modification is required, please contact your local Rosemount Analytical Service Group or National Response Center at 1-800-654-7768.

PREFACE

The purpose of this manual is to provide a comprehensive understanding of the OCX 8800 components, functions, installation, and maintenance.

We recommend that you thoroughly familiarize yourself with the Introduction and Installation sections before installing your transmitter.

The introduction presents the basic principles of the transmitter along with its performance characteristics and components. The remaining sections contain detailed procedures and information necessary to install and service the transmitter.

Before contacting Rosemount Analytical concerning any questions, first consult this manual. It describes most situations encountered in your equipment's operation and details necessary action.

DEFINITIONS

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this publication.

⚠WARNING

Highlights an operation or maintenance procedure, practice, condition, statement, etc. If not strictly observed, could result in injury, death, or long-term health hazards of personnel.

⚠CAUTION

Highlights an operation or maintenance procedure, practice, condition, statement, etc. If not strictly observed, could result in damage to or destruction of equipment, or loss of effectiveness.

NOTE
Highlights an essential operating procedure, condition, or statement.

SYMBOLS

⏚ : EARTH (GROUND) TERMINAL

⏚ : PROTECTIVE CONDUCTOR TERMINAL

⚠ : RISK OF ELECTRICAL SHOCK

⚠ : WARNING: REFER TO INSTRUCTION BULLETIN

NOTE TO USERS

The number in the lower right corner of each illustration in this publication is a manual illustration number. It is not a part number, and is not related to the illustration in any technical manner.

Section 1 Description and Specifications

Component Checklist . . . . . **page 1-1**
System Overview . . . . . **page 1-1**
Specifications . . . . . **page 1-9**

COMPONENT CHECKLIST

A typical OCX 8800 Oxygen/Combustibles Transmitter package should contain the items shown in Figure 1-1.

Use the product matrix in Table 1-1 at the end of this section to verify your order number. The first part of the matrix defines the model. The last part defines the various options and features of the OCX 8800. Check the model number against the transmitter features and options, making sure options specified by this number are on or included with the unit. Use this complete model number for any correspondence with Rosemount Analytical. A list of accessories for use with the OCX 8800 is provided in Table 1-2.

SYSTEM OVERVIEW

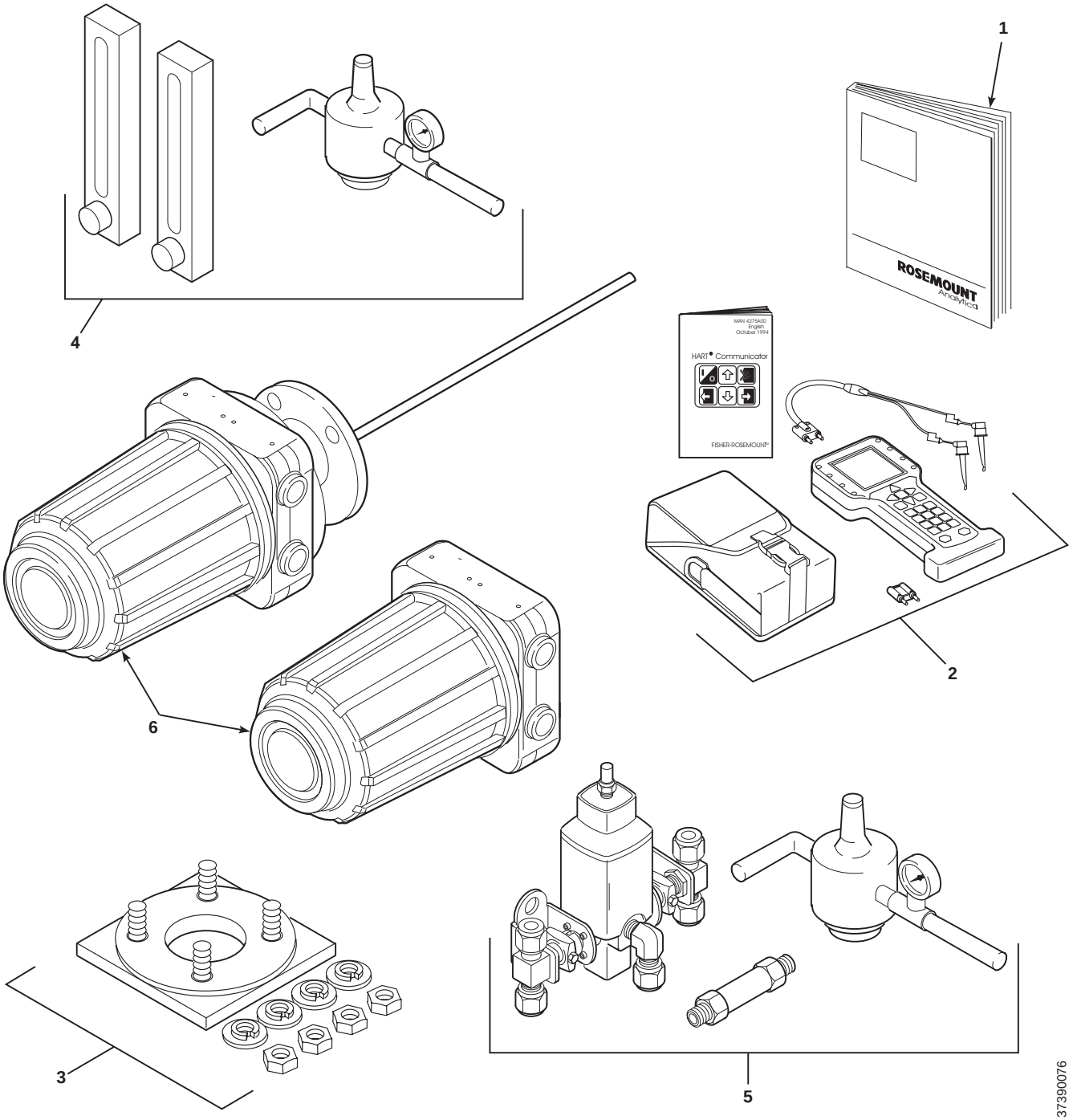
Scope

This Instruction Manual supplies details needed to install, startup, operate, and maintain the OCX 8800. Signal conditioning electronics outputs separate 4-20 mA signals representing oxygen (O_2) and combustibles (COe) values. This information, plus additional details, can be accessed with the HART Model 275/375 handheld communicator or Emerson Process Management AMS software.

System Description

The OCX 8800 is designed to measure oxygen and combustible concentrations in flue gas temperatures up to 2600°F (1427°C). Electrical connections, power and communications are made through two 3/4 NPT ports in the flameproof electronics enclosure using fittings and cables provided by the customer. Cable installation must meet NEC, IEC and/or other applicable national or local codes for Class I, Zone 1, Group IIB +H2 T3/T6 permanently mounted equipment. The transmitter is close coupled to the process and requires minimal sample conditioning requirements.

Figure 1-1. Typical System Package



1. Instruction Manual
2. HART®Communicator Package (optional)
3. Adapter Plate with Mounting Hardware and Gasket
4. Reference Air and Calibration Set
5. Blowback Hardware (optional)
6. OCX 8800 with Remote Electronics

The equipment measures oxygen percentage by reading the voltage developed across a heated electrochemical cell, which consists of a small yttria-stabilized, zirconia disc. Both sides of the disc are coated with porous metal electrodes. When operated at the proper temperature, the millivolt output of the cell is given by the following Nernst equation:

$$EMF = KT \log10 (P_1/P_2) + C$$

Where:

1. P_2 is the partial pressure of the oxygen in the measured gas on one side of the cell.
2. P_1 is the partial pressure of the oxygen in the reference air on the opposite side of the cell.
3. T is the absolute temperature.
4. C is the cell constant.
5. K is an arithmetic constant.

NOTE
For best results, use clean, dry instrument air (20.95% oxygen) as the reference air.

When the cell is at operating temperature and there are unequal oxygen concentrations across the cell, oxygen ions will travel from the high oxygen partial pressure side to the low oxygen partial pressure side of the cell. The resulting logarithmic output voltage is approximately 50 mV per decade. The output is proportional to the inverse logarithm of the oxygen concentration. Therefore, the output signal increases as the oxygen concentration of the sample gas decreases. This characteristic enables the OCX 8800 to provide exceptional sensitivity at low oxygen concentrations.

The OCX 8800 measures net oxygen concentration in the presence of all the products of combustion, including water vapor. Therefore, it may be considered an analysis on a "wet" basis. In comparison with older methods, such as the portable apparatus, which provides an analysis on a "dry" gas basis, the "wet" analysis will, in general, indicate a lower percentage of oxygen. The difference will be proportional to the water content of the sampled gas stream.

The OCX 8800 combustibles sensor is a catalytic sensor consisting of two Resistance Devices (RTD). One RTD is the reference element covered with an inert coating. The other RTD element is active, coated with a catalyst. As the sample gases flow by the sensor, the combustible gases oxidize on the surface of the active element. The oxidation that occurs produces heat and a temperature rise in the active element. The temperature difference produces a resistance relationship between the two elements that is directly proportional to the concentration of combustibles in the sample gases.

The catalyst is specifically designed to detect carbon monoxide (CO), but the sensor responds to other combustible gases. The sensor is calibrated using CO, thus the output should be expressed in terms of CO. However, since the sensor detects other combustible gases, the output cannot just be labeled CO. The response of the sensor to other combustible gases gives an output that is equivalent to the sensor detecting CO. The term COe is used in this manual to describe the sensor output. This term indicates that the sensor is calibrated in terms of CO, and that the sensor output is equivalent to CO but not specific to CO.

Dilution air is provided to the COe sensor to ensure there is adequate oxygen to fully oxidize any combustible gases regardless of the concentration of oxygen in the process.

System Configuration

Transmitters are available in four lengths, giving the user the flexibility to use a penetration appropriate to the size of the stack or duct. The length options are 18 in. (457 mm), 3 ft (0.91 m), 6 ft (1.83 m), or 9 ft (2.7 m). Probes are available in three material options, 316L stainless steel, inconel 600, and ceramic to accommodate higher temperatures.

The electronics are contained in a separate housing from the sensors. The electronics housing may be mounted up to 150 feet away from the sensor housing.

The electronics control both sensor temperatures and provide individual 4-20 mA isolated outputs that are proportional to the measured oxygen and combustibles concentrations. The power supply can accept voltages of 100 to 240 VAC and 50 to 60 Hz. The electronics accepts millivolt signals generated by the sensors and produces the outputs to be used by remotely connected devices. The outputs are isolated 4-20 mA linearized currents. Refer to Section 3, Configuration and Startup for specific instructions upon initial power up.

System Features

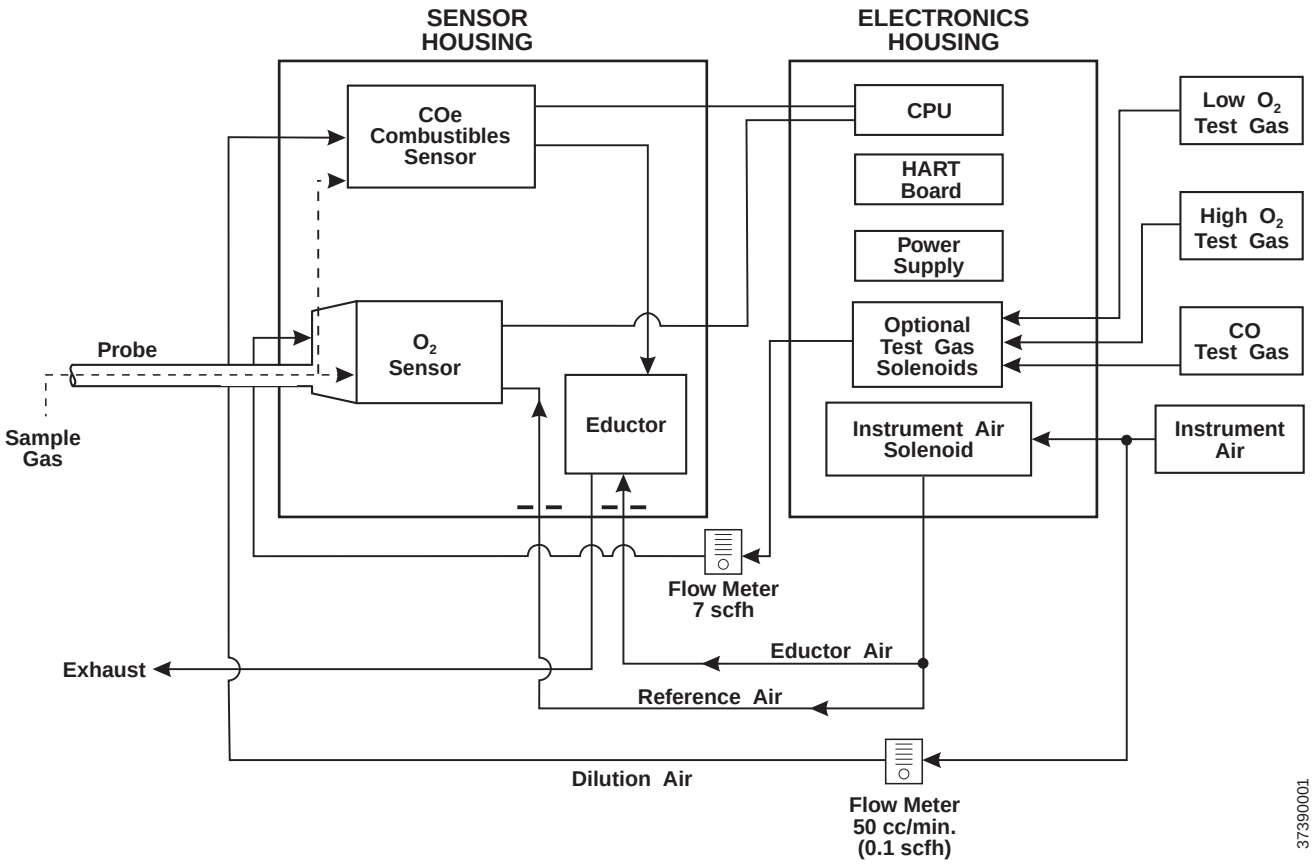
1. The O_2 cell output voltage and sensitivity increase as the oxygen concentration decreases.
2. HART communication is standard. To use the HART capability, you must have either:
   a. HART Model 275/375 Communicator.
   b. AMS software for the PC.
3. Oxygen cell and heater/thermocouple assembly are field replaceable.
4. Electronics are automatically configured for line voltages from 100 to 240 VAC.

5. An operator can calibrate and diagnostically troubleshoot the OCX 8800 using the HART Interface. Each of the OCX 8800's 4-20 mA output lines transmit an analog signal proportional to oxygen or combustible levels detected. The HART output is superimposed on the oxygen 4-20 mA output line only. This information can be accessed through the following:
    - Model 275/375 Handheld Communicator - The handheld communicator requires Device Description (DD) software specific to the OCX 8800. The DD software will be supplied with many Model 275/375 units, but can also be programmed into existing units at most Emerson Process Management service offices. Refer to Section 4, Using HART Communications, for additional information.
    - Personal Computer (PC) - The use of a personal computer requires AMS software available from Emerson Process Management.
    - Selected Distributed Control Systems - The use of distributed control systems requires input/output (I/O) hardware and AMS software which permit HART communications.
6. Optional Blowback System. The blowback system periodically blows instrument air back through the sample line filter and out the sample tube. This clears out particulate and keeps the sample line filter from clogging.

System Operation

Figure 1-2 shows the relationship between the components of the OCX 8800. The sensors and the electronics are contained in separate housings. The sensor housing and probe mounts to a duct or process wall so that the probe protrudes into the flue gas stream. An air powered eductor continuously pulls samples of the process flue gas through the probe to a chamber in front of the sensor housing where the sample passes the O_2 sensor and continues on to the COe sensor. Dilution air is provided to the COe sensor and reference air to the O_2 sensor. After the gas sample flows past the O_2 sensor and through the COe sensor, it is drawn through the eductor where it mixes with the eductor air and exits through exhaust back into the system. The electronics housing contains the CPU and HART boards which convert the sensor inputs into 4-20 mA analog output signals. The CPU can also initiate and perform calibrations. Three test gasses and instrument air can be turned on and off by solenoids. Test gas flow to the sensors is regulated by a flow meter between the electronics and sensor housings. Instrument air is separated into eductor air, reference air, and dilution air. The instrument air solenoid does not allow air flow until the heaters are up to temperature. This minimizes the amount of sampled process flue gas being pulled into cold sensors causing condensation.

Figure 1-2. System Operation Diagram



Handling the OCX 8800

⚠WARNING

It is important that printed circuit boards and integrated circuits are handled only when adequate antistatic precautions have been taken to prevent possible equipment damage.

The OCX 8800 is designed for industrial application. Treat each component of the system with care to avoid physical damage. The probe may contain components made from ceramics, which are susceptible to shock when mishandled.

System Considerations

Prior to installing your OCX 8800, make sure you have all the components necessary to make the system installation. Ensure all the components are properly integrated to make the system functional.

After verifying that you have all the components, select mounting locations and determine how each component will be placed in terms of available line voltage, ambient temperatures, environmental considerations, convenience, and serviceability. Figure 1-3 shows a typical system wiring. Simplified installations for the OCX 8800 are shown in Figure 1-4.

A source of instrument air is required at the OCX 8800 for reference air, dilution air, and eductor air. Since the OCX 8800 is equipped with an in-place calibration feature, provision should be made for connecting test gas tanks to the OCX 8800 when it is to be calibrated.

NOTE
The electronics module is designed to meet NEMA 4 (IP66) and the electronic components are rated to temperatures up to 185°F (85°C).

Retain packaging in which the unit arrived from the factory in case any components are to be shipped to another site. This packaging has been designed to protect the product.

Figure 1-3. OCX 8800 HART Connections and AMS Application

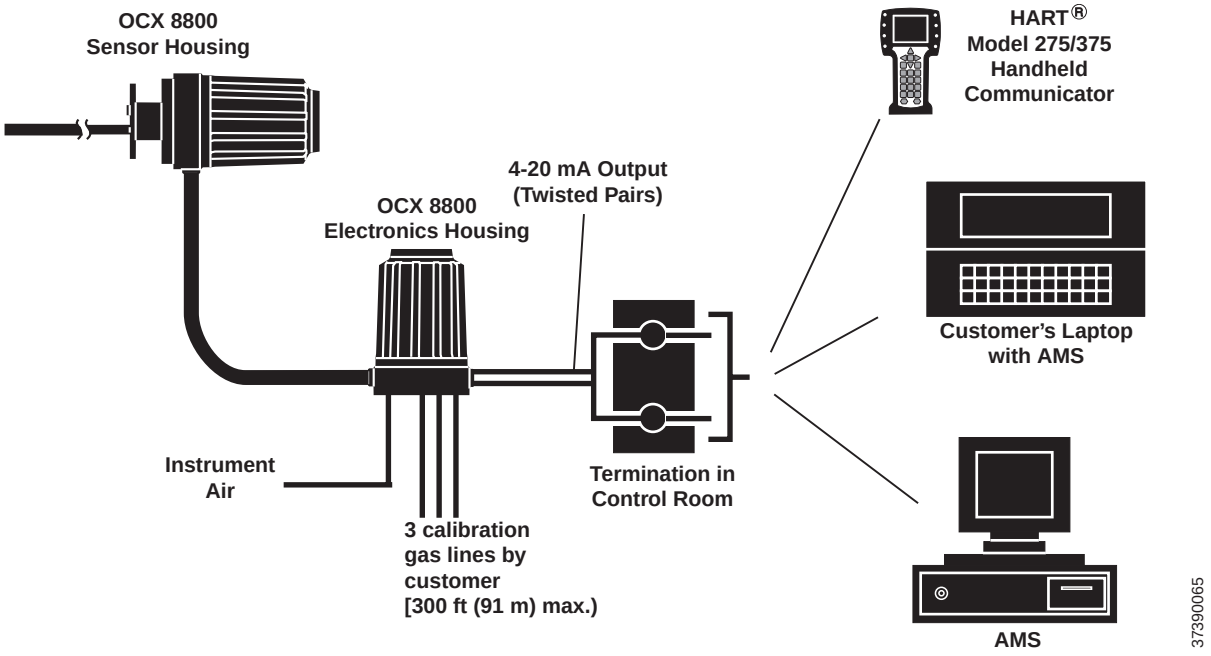
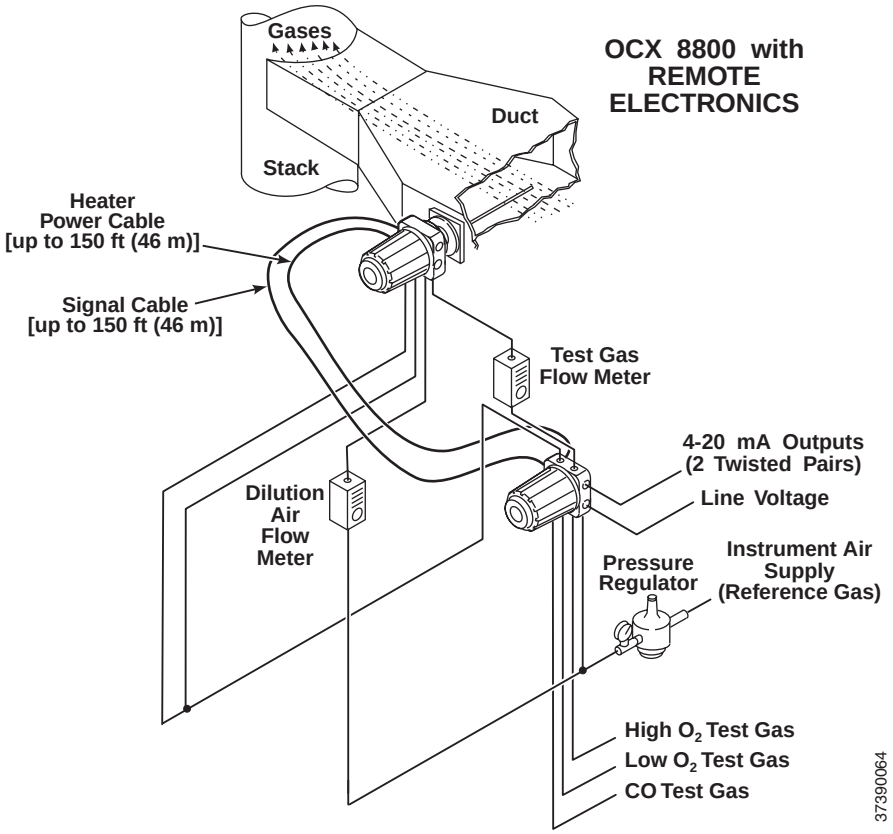


Figure 1-4. Typical System Installation



SPECIFICATIONS

General Purpose OCX

Specifications	
Net O_2 Range	0-1% to 0-40% O_2, fully field selectable
Combustibles	0-1000 ppm to 0-5%, fully field selectable
Accuracy	
Oxygen	± 0.75% of reading or 0.05% O_2 (whichever is greater)
Combustibles	± 2% range
System Response to Test Gas	
Oxygen	10 sec T90
Combustibles	25 sec T90
Temperature Limits	
Process	32° to 2600°F (0° to 1427°C)
Sensors Housing	-40° to 212°F (-40° to 100°C), ambient
Electronics Housing	-40° to 149°F (-40° to 65°C), ambient -40° to 185°F (-40° to 85°C), internal - operating temperature of electronics inside instrument housing, as measured by a HART communicator or AMS software
Nominal and Approximate Shipping Weights	
18 in. (457 mm) probe package	54 lbs (20 kg)
3 ft (0.91 m) probe package	55 lbs (20.5 kg)
6 ft (1.83 m) probe package	57 lbs (21 kg)
9 ft (2.74 m) probe package	59 lbs (22 kg)
Mounting and Mounting Positions	
Sensors Housing	Flange
Electronics Housing	Wall/Pipe
Materials	
Probes	316L stainless steel - 1300°F (704°C) Inconel 600 - 1832°F (1000°C) Ceramic - 2600°F (1427°C)
Enclosures	Low-copper aluminum
Calibration	Semi-automatic or automatic
Calibration Gas Mixtures Recommended (Ref. test gas bottles kit #1A99119G04)	0.4% O_2, Balance N2 8% O_2, Balance N2 1000 ppm CO, Balance Air
Calibration Gas Flow	7 scfh (3.3 l/m)
Reference Air	2 scfh (1 l/m), clean, dry instrument-quality air (20.95% O_2), regulated to 35 psi (241 kPa)
Eductor Air	5 scfh (2.5 l/m), clean, dry, instrument-quality air 20.95% O_2), regulated to 35 psi (241 kPa)
Dilution Air	0.1 scfh (0.5 l/m), clean, dry, instrument-quality air (20.95% O_2) regulated to 35 psi (241 kPa)
Blowback Air (optional)	Clean, dry, instrument-quality air (20.95% O_2), regulated to 55 psi (379 kPa)

Table continued on next page

Specifications	
Sensors Housing	NEMA 4, IP66 with fitting and pipe on reference exhaust port to clean, dry atmosphere, two 3/4-14 NPT conduit ports
Electronics Housing	NEMA 4, IP66 with fitting and pipe on reference exhaust port to clean, dry atmosphere, two 3/4-14 NPT conduit ports
Electrical Noise	EN 61326-1, Class A
Certifications	CE, CSA C US, FM APPROVED
Line Voltage	Universal 100 to 240 VAC ±10%, 50 to 60 Hz, no switches or jumpers required, 3/4-14 NPT conduit port
Pollution Degree	2
Over Voltage Category	II
Relative Humidity	5 to 95% (non-condensing)
Isolated Output	
Oxygen	4-20 mAdc, 950 ohm maximum, with HART capability
Combustibles	4-20 mAdc, 950 ohm maximum
Alarm	Alarm output relay - dry contact, form C, 30mA, 30VDC capacity
Power Consumption	750 W maximum
Mounting and Mounting Positions	
Sensor Housing	Flange
Electronics Housing	Wall/Pipe

NOTE
All static performance characteristics are with operating variables constant. Specifications subject to change without notice.

Table 1-1. Product Matrix - General Purpose OCX 8800

OCX88A	O_2/Combustibles Transmitter

Code	Probe Length and Material	
00	No Probe or Exhaust Tube	
11	18 in. (457 mm) 316 SST	up to 1300°F (704°C)
21	18 in. (457 mm) Inconel 600	up to 2600°F (1427°C)
31	18 in. (457 mm) Ceramic	up to 2600°F (1427°C)
12	3 ft (0.91 m) 316 SST	up to 1300°F (704°C)
22	3 ft (0.91 m) Inconel 600	up to 1832°F (1000°C)
32	3 ft (0.91 m) Ceramic	up to 2600°F (1427°C)
13	6 ft (1.83 m) 316 SST	up to 1300°F (704°C)
23	6 ft (1.83 m) Inconel 600	up to 1832°F (1000°C)
14	9 ft (2.7 m) 316 SST	up to 1300°F (704°C)
24	9 ft (2.7 m) Inconel 600	up to 1832°F (1000°C)

Code	Probe Mounting Assembly
10	(ANSI 2 in. 150 lb) 6" dia. flange, 4.75" BC with 4 x 0.75" dia. holes
20	(DIN) 185 mm dia. flange, 145 mm BC with 4 x 18 mm dia. holes

Code	Mounting Hardware - Stack Side
0	No Adapter Plate (“0” must be chosen under “Mounting Adapter - Probe Side” below)
1	New Installation - Square weld plate with studs
2	Model 218/240 Mounting Plate (with Model 218/240 Shield Removed)
3	Existing Model 218/240 Support Shield
4	Special Mounting(1)
5	Model 132 Adapter Plate

Code	Mounting Hardware - Probe Side
0	No Adapter Plate
1	Probe Only (ANSI)
2	Probe Only (DIN)

Code	Electronics Housing - Communications
H1	HART Communications
H2	HART Communications with Local Operator Interface
H3	HART Communications with Calibration Solenoids
H4	HART Communications with Local Operator Interface and Calibration Solenoids

Code	Electronics Mounting
01	Integral to Sensor Housing
02	Remote Electronics and no cable
03	Remote Electronics and 20 ft (6 m) cable
04	Remote Electronics and 40 ft (12 m) cable
05	Remote Electronics and 60 ft (18 m) cable
06	Remote Electronics and 80 ft (24 m) cable
07	Remote Electronics and 100 ft (30 m) cable
08	Remote Electronics and 150 ft (46 m) cable

Code	Accessories
00	None
01	Flow meters & Ref. Air Set
02	In-Situ Filter (Stainless Steel only)
03	In-Situ Filter (SST), Flow meters & Ref. Air Set
11	Flow meters, and Ref. Air Set with Blowback
12	In-Situ Filter (SST) with Blowback
13	In-Situ Filter (SST), Flow meters & Ref. Air Set with Blowback

OCX88A	11	10	1	1	H3	06	02	Example

NOTE:
(1) Provide details of the existing mounting plate as follows:

Plate with studs	Bolt circle diameter, number, and arrangement of studs, stud thread, stud height above mounting plate.
Plate without studs	Bolt circle diameter, number, and arrangement of holes, thread, depth of stud mounting plate with accessories.

Table 1-2. Accessories

PART NUMBER	DESCRIPTION
1A99119H01	Oxygen test gas bottle; 0.4% O_2, balance N_2
1A99119H02	Oxygen test gas bottle; 8.0% O_2, balance N_2
1A 99119H07	CO test gas bottle; 1000 ppm CO, balance air
1A99120H02	Regulator for Oxygen (may need 2)
1A99120H03	Regulator for CO test gas
1A99119G06	Wall mount bracket for test gas bottles
1A99119G05	Test gas regulators kit
1A99119G04	Test gas bottles kit
1A99292H01	Moore Industries SPA for Low O_2 Alarm, High COe Alarm, Calibration Status, and Unit Fail
1A99339H03	Blowback valve, air operated
1A99784H02	375 HART Communicator with 12 Megabyte buffer, model no. 375HR1EKLU
6A00171G01	Power line filter kit

Section 2 Installation

Mechanical Installation . . . . . **page 2-2**
Electrical Installation . . . . . **page 2-8**
Pneumatic Installation . . . . . **page 2-14**
Initial Startup . . . . . **page 2-20**

⚠WARNING

Before installing this equipment, read the "Safety instructions for the wiring and installation of this apparatus" in Appendix A: Safety Data. Failure to follow the safety instructions could result in serious injury or death.

⚠WARNING

The OCX88A can be installed in general purpose areas only. Do not install the OCX88A in hazardous areas.

MECHANICAL INSTALLATION

Selecting Location

1. The location of the OCX 8800 in the stack or flue is most important for maximum accuracy in the oxygen analyzing process. The probe must be positioned so the gas it measures is representative of the process. Best results are normally obtained if the transmitter is positioned near the center of the duct (40-60% insertion). Longer ducts may require several transmitters since the oxygen and combustibles can vary due to stratification. A point too near the wall of the duct or the inside radius of a bend, may not provide a representative sample because of the very low flow conditions. The sensing point should be selected so the process gas temperature falls within the range of probe material used. Figure 2-1 through Figure 2-4 provide mechanical installation references. The ambient temperature inside the electronics housing must not exceed 185°F (85°C).
2. Check the flue or stack for holes and air leakage. The presence of this condition will substantially affect the accuracy of the oxygen and combustibles readings. Therefore, either make the necessary repairs or install the transmitter up stream of any leakage.
3. Ensure the area is clear of internal and external obstructions that will interfere with installation and maintenance access to the unit. Allow adequate clearance for the removal of the OCX 8800.

⚠CAUTION

Do not allow the temperature of the electronics housing to exceed 185°F (85°C) or damage to the electronics may result.

⚠CAUTION

Whenever a positive stack pressure exists at the installation site, be sure to connect all pneumatic lines prior to installing the OCX 8800 in the stack or ductwork. Failure to connect the pneumatic lines can allow the flow of contaminants into the OCX 8800 ports.

⚠CAUTION

Before installing the OCX 8800 into a hot stack or ductwork, make sure that the OCX 8800 is turned on and at normal operating temperature. Exposing a cold OCX transmitter to hot process gases can cause permanent damage to the equipment.

Installation

1. Ensure all components are available to install the OCX 8800.
2. The OCX 8800 may be installed intact as it is received.
3. Weld or bolt adapter plate (Figure 2-2) onto the duct.

4. Use the pipe or wall mounting hardware as shown in Figure 2-3 to mount the electronics housing. Choose a location not to exceed the length of the electronics cable ordered.
5. Ensure the conduits drop vertically from the OCX 8800 and the conduit is routed below the level of the conduit ports on the housing to form a drip loop. Drip loops minimize the possibility that moisture will damage the electronics (Figure 2-4).
6. Where a positive stack pressure exists at the installation site, connect all pneumatic lines prior to installing the OCX 8800 in the stack or ductwork.

NOTE
If process temperatures will exceed 392°F (200°C), use anti-seize compound on stud threads to ease future removal of the OCX 8800.

7. Insert sample and exhaust tubes through the opening in the mounting flange and bolt the unit to the flange.

⚠CAUTION

Uninsulated stacks or ducts may cause ambient temperatures in the electronics housing to exceed 185°F (85°C) and damage the electronics.

8. If insulation is removed to access the duct for OCX 8800 mounting, make sure to replace insulation afterward.

Enclosures

The OCX 8800 enclosures are designed to meet ingress conditions of IP66. Each enclosure cover is threaded to its base and sealed with an o-ring that isolates the threads from external contaminants.

Each cover is secured by a clip attached to the base that engages the cover between the ribs of the cover sidewall. The clip is held in place by an Allen head cap screw and lockwasher mounted in a recess. Cover removal and installation requires an Allen wrench to loosen and tighten the screw.

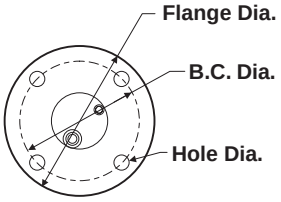
Figure 2-1. Installation, OCX 8800

NOTE

All dimensions are in inches with millimeters in parentheses.

Insulate if exposed to adverse weather or extreme temperature changes, install a protective housing and/or insulation around the unit.

Table 1. Mounting Flange		
	ANSI 5R10244H01	DIN 5R10244H02
Flange Dia.	6.00 (152)	7.28 (185)
Hole Dia.	0.75 (19)	0.71 (18)
(4) Holes equally spaced on B.C. dia	4.75 (121)	5.71 (145)



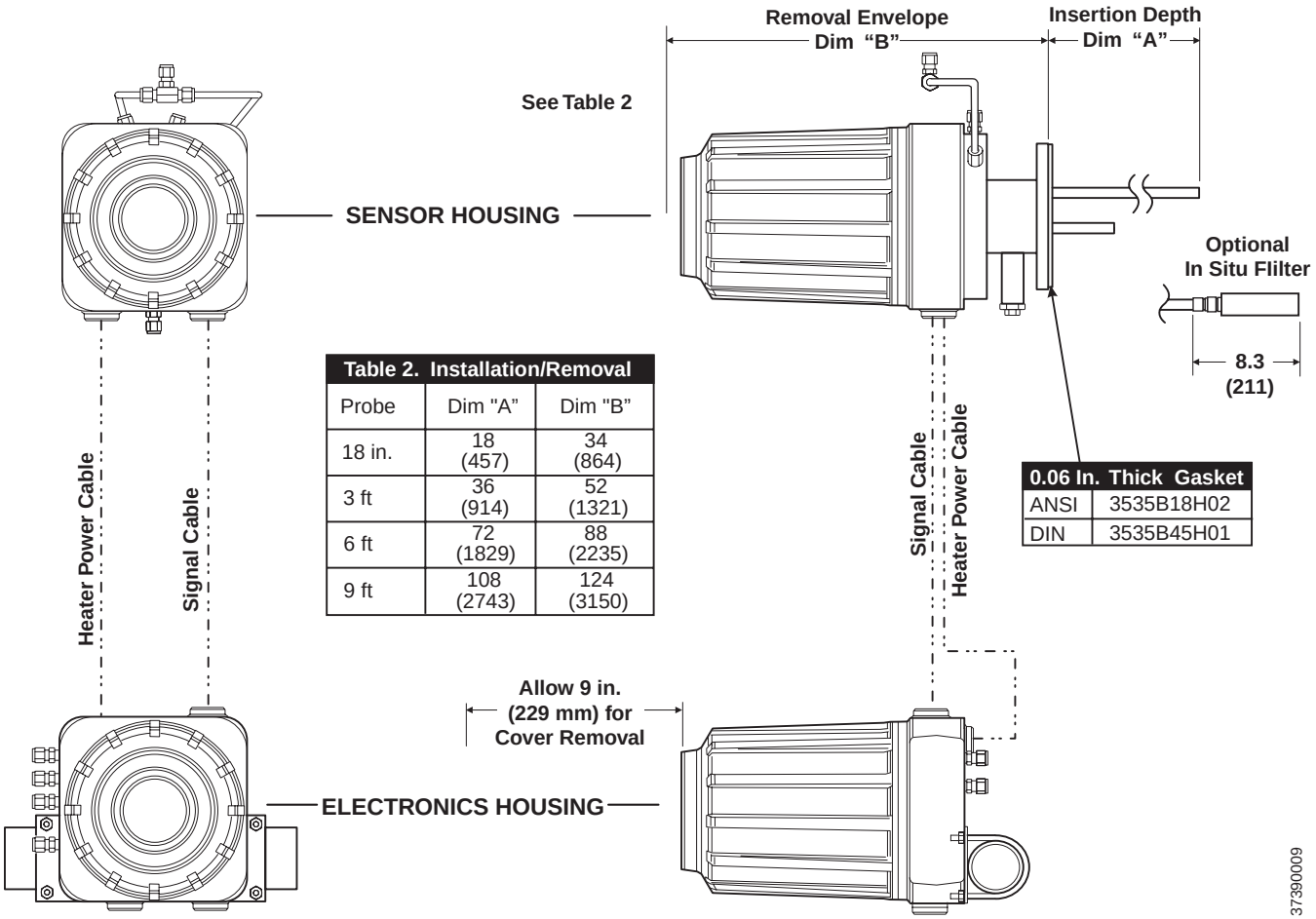


Table 2. Installation/Removal		
Probe	Dim "A"	Dim "B"
18 in.	18 (457)	34 (864)
3 ft	36 (914)	52 (1321)
6 ft	72 (1829)	88 (2235)
9 ft	108 (2743)	124 (3150)

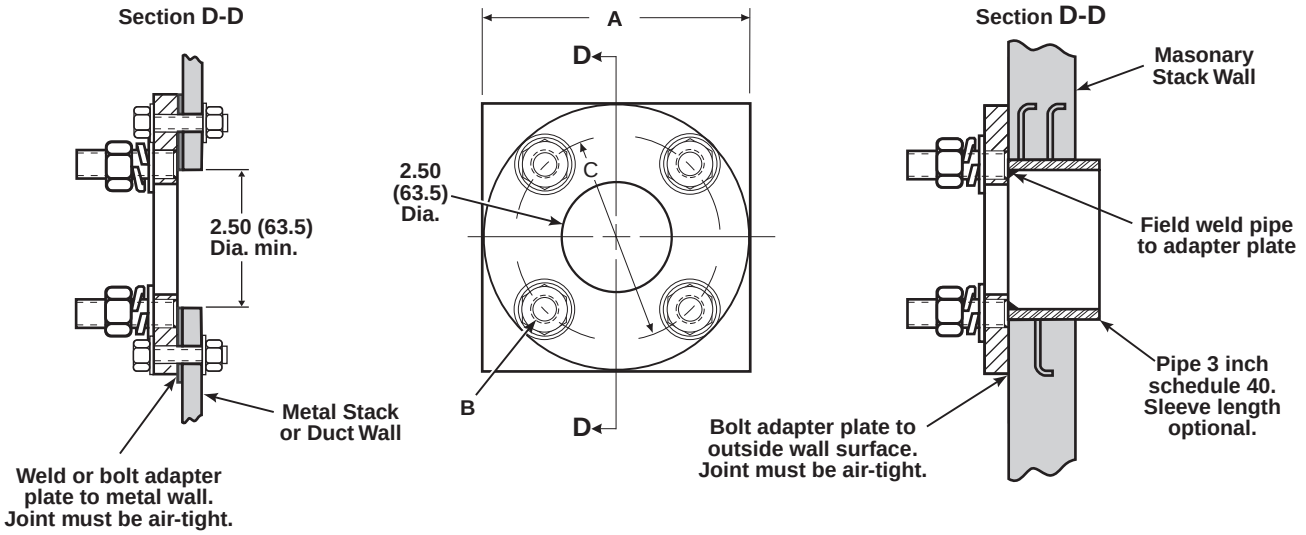
0.06 In. Thick Gasket	
ANSI	3535B18H02
DIN	3535B45H01

Figure 2-2. Adapter Plate Installation

NOTE: Dimensions are in inches with millimeters in parentheses.
Only adapter plate is furnished by Rosemount Analytical.

Adapter Plate Kit - Mounting Dimensions			
*Type Part Number	Plate Size "A"	Stud Size "B"	Bolt Circle Dia. "C"
ANSI (P/N 4512C34G01)	6.00 (152)	5/8 -11 UNC - 2A	4.75 (121)
DIN (P/N 4512C36G01)	7.50 (191)	(M-16 x 2.0 - 6g)	5.71 (145)

***Part numbers for adapter plates include attaching hardware.**


Section D-D
2.50 (63.5) Dia. min.
Metal Stack or Duct Wall
Weld or bolt adapter plate to metal wall. Joint must be air-tight.
A
D
C
2.50 (63.5) Dia.
B
D
Section D-D
Masonary Stack Wall
Field weld pipe to adapter plate
Pipe 3 inch schedule 40. Sleeve length optional.
Bolt adapter plate to outside wall surface. Joint must be air-tight.

METAL WALL STACK OR DUCT CONSTRUCTION

MASONRY WALL STACK CONSTRUCTION

37390010

Figure 2-3. Wall or Pipe Mounting of Electronics Housing

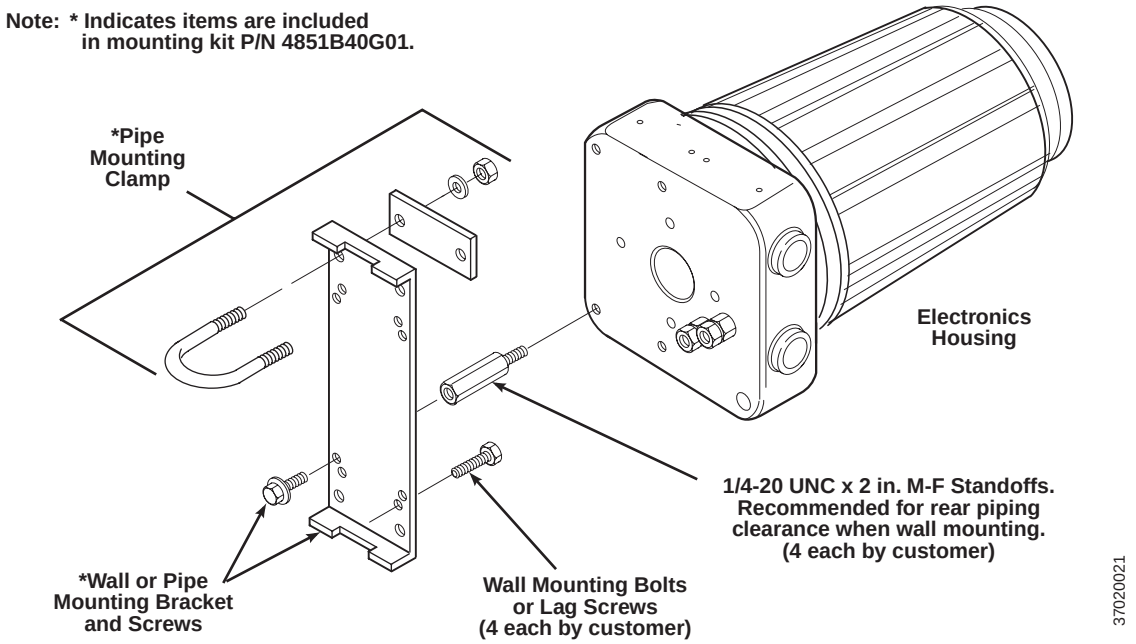
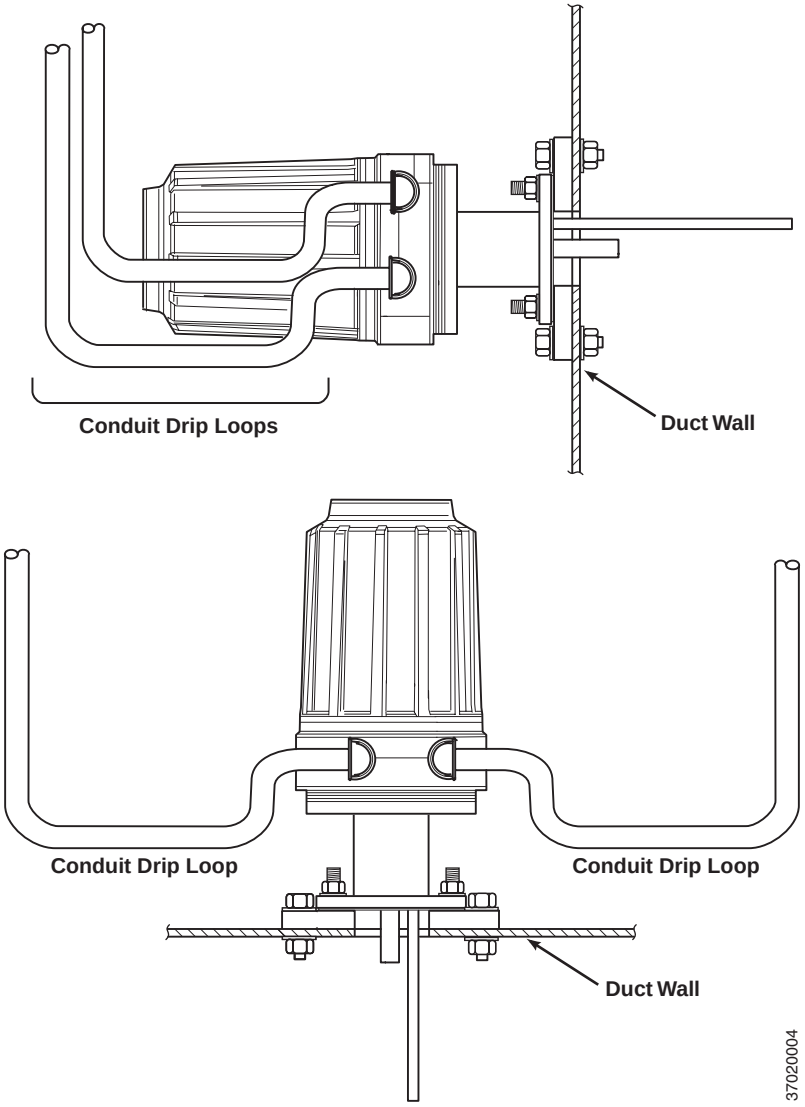

Note: * Indicates items are included in mounting kit P/N 4851B40G01.
*Pipe Mounting Clamp
Electronics Housing
1/4-20 UNC x 2 in. M-F Standoffs. Recommended for rear piping clearance when wall mounting. (4 each by customer)
*Wall or Pipe Mounting Bracket and Screws
Wall Mounting Bolts or Lag Screws (4 each by customer)
37020021

Figure 2-4. Installation with Drip Loops



ELECTRICAL INSTALLATION

All wiring must conform to local and national codes. For reference, factory wired solenoid power connections are shown in Figure 2-5.

⚠WARNING

Disconnect and lock out power before connecting the unit to the power supply. Failure to lock out power could result in serious injury or death.

⚠WARNING

Install all protective equipment covers and safety ground leads after installation. Failure to install covers and ground leads could result in serious injury or death.

⚠WARNING

To meet the Safety Requirements of IEC 1010 (EC requirement), and ensure safe operation of this equipment, connection to the main electrical power supply must be made through a circuit breaker (min 10 A) in close proximity and marked for this equipment which will disconnect all current-carrying conductors during a fault situation. This circuit breaker should also include a mechanically operated isolating switch. If not, then another external means of disconnecting the supply from the equipment should be located close by. Circuit breakers or switches must comply with a recognized standard such as IEC 947.

⚠WARNING

The OCX88A can be installed in general purpose areas only. Do not install the OCX88A in hazardous areas.

NOTE
To maintain proper earth grounding, ensure a positive connection exists between the sensor housing, the electronics housing, and earth. The connecting ground wire must be 14 AWG minimum. Refer to Figure 2-5.

NOTE
Line voltage, signal, and relay wiring must be rated for at least 105ºC (221ºF).

Electrical Connections

Electrical connections, power and communications are made to the electronic enclosure. The connections are made through two 3/4 NPT ports in the enclosure using fittings and cables provided by the customer. Cable installation must meet NEC, IEC and/or other applicable national or local codes for Class I, Zone 1, IIB +H2 T3/T6 permanently mounted equipment.

Connect Line Voltage

The OCX 8800 operates on 100 to 240 VAC line voltage at 50 to 60 Hz. The power supply requires no setup. Connect the line (L wire) to the L terminal, and the neutral (N wire) to the N terminal on the AC power input terminal block in the electronics housing. Connect the ground (G wire) to the ground stud in the electronics housing as shown in Figure 2-5.

Connect 4-20 mA Signals

Connect the 4-20 mA current loop to the 4-20 mA signal output terminals in the electronics housing as shown in Figure 2-5. Use individual shielded twisted wire pairs. Terminate the shield at the electronics housing.

O_2 4-20 mA Signal

One 4-20 mA signal represents the O_2 value. Superimposed on the O_2 signal is the HART information accessible through a Model 275/375 Handheld Communicator or AMS software. The O_2 signal is at the AOUT 1 terminals.

COe 4-20 mA Signal

Another 4-20 mA signal at the AOUT 2 terminals represents the COe value. HART information is not available on the COe signal.

Alarm Output Relay

Connect any customer-supplied relay input to the alarm output relay terminal. Use shielded wire and terminate the shield at the electronics housing. The alarm output relay terminal is a set of dry, no. 2, form C, contacts with 30 mA, 30 VDC capacity.

Remote Electronics Connections to Sensor Housing

Make the following connections between the electronics and sensor housings with the electronics cable ordered with the package (Figure 2-6). Braided cable is available in lengths up to 150 ft. (46 m).

NOTE
Interconnect wiring shown is for Rosemount Analytical supplied cables. For customer furnished interconnect wiring or cables, refer to Figure 2-7.

Signal Connections

Connect the electronics housing terminals to the corresponding terminals in the sensor housing. The twisted wire pairs are numbered on the inner plastic wrapper. Keep twisted pairs together and match the numbers and wire colors shown in Figure 2-6.

Heater Power Connections

Use the blue, white, orange black, red, and yellow stranded wires in the heater power cable to connect power to the three heaters in the sensor housing. Match the wire colors to the corresponding heater power terminal blocks in the sensor and electronics housings as shown in Figure 2-6.

Figure 2-5. Line Voltage, Earth, and 4-20 mA Connections

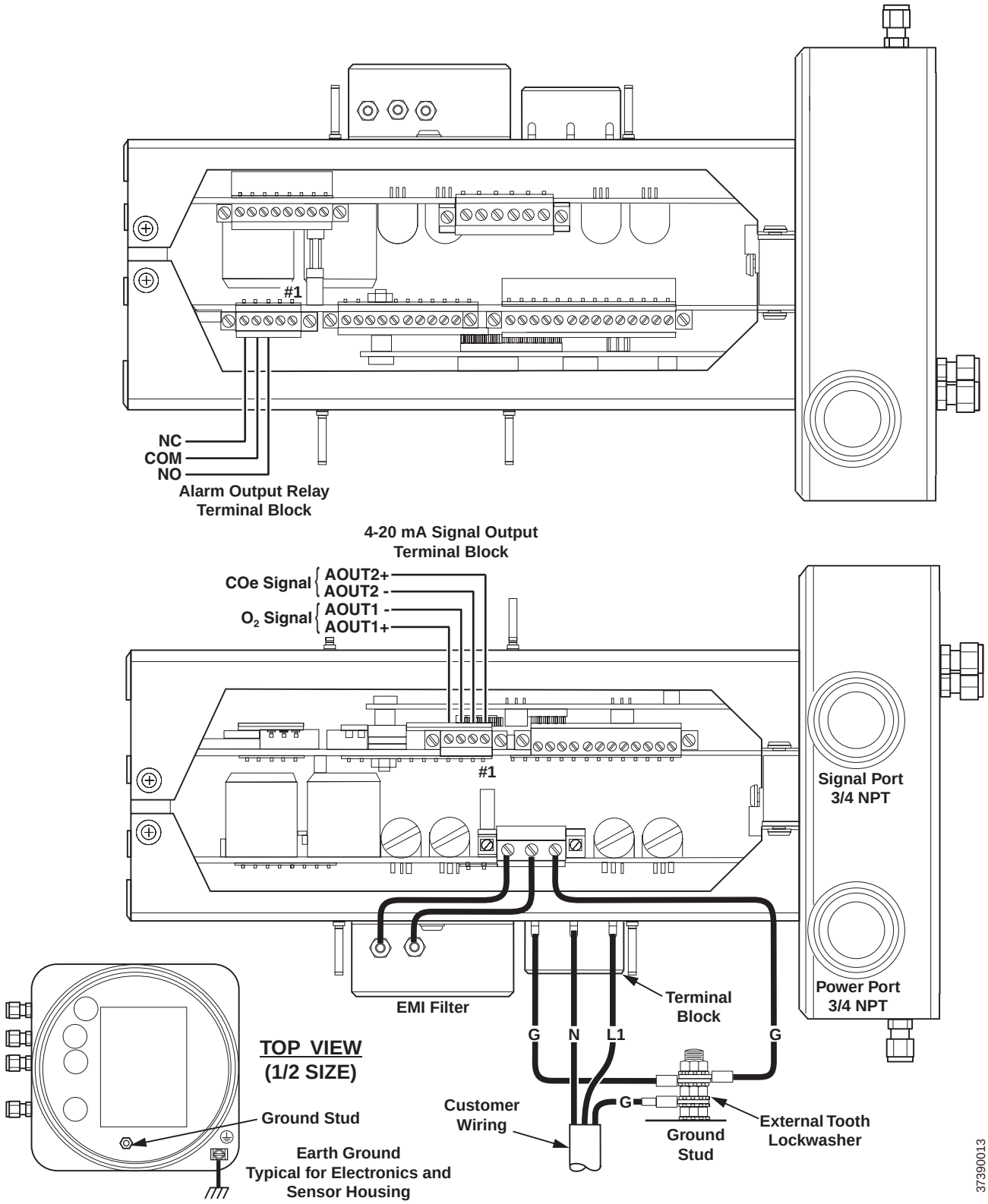


Figure 2-6. Electrical Connections Between Remote Electronics and Sensor Housing

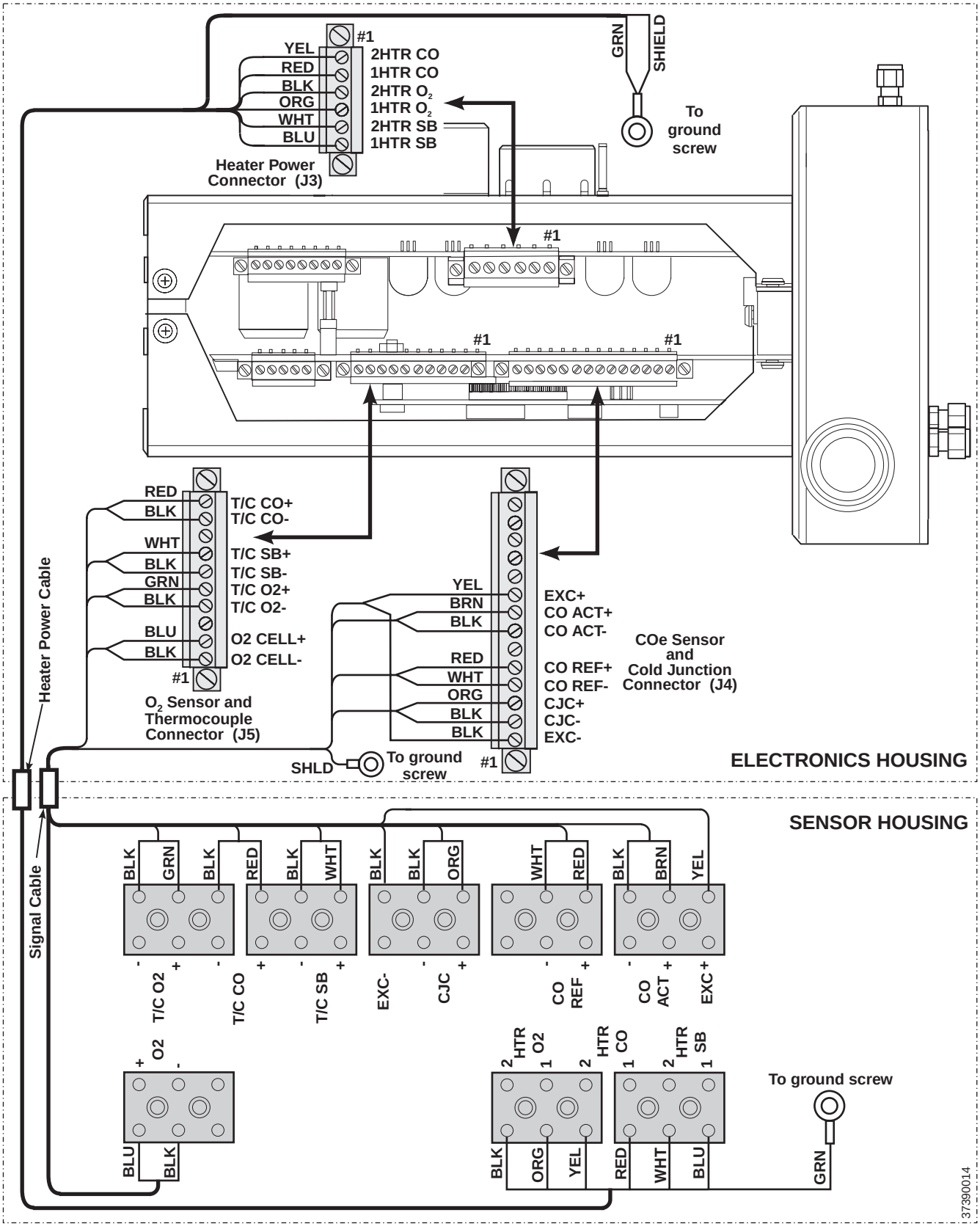
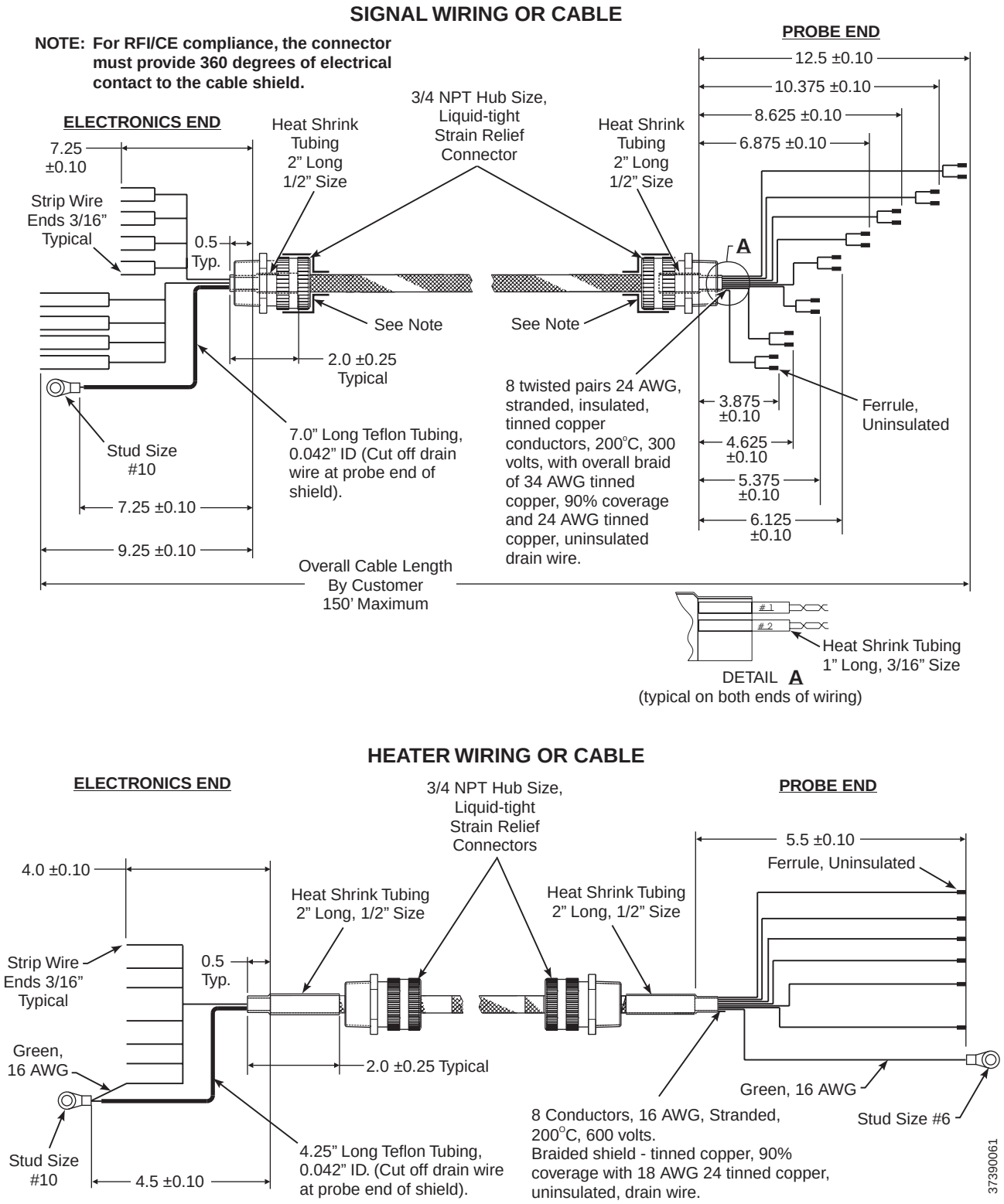


Figure 2-7. Customer-Furnished Interconnect Wiring or Cables


SIGNAL WIRING OR CABLE
NOTE: For RFI/CE compliance, the connector must provide 360 degrees of electrical contact to the cable shield.
ELECTRONICS END
PROBE END
7.25 ±0.10
Strip Wire Ends 3/16" Typical
0.5 Typ.
Heat Shrink Tubing 2" Long 1/2" Size
3/4 NPT Hub Size, Liquid-tight Strain Relief Connector
Heat Shrink Tubing 2" Long 1/2" Size
12.5 ±0.10
10.375 ±0.10
8.625 ±0.10
6.875 ±0.10
A
See Note
See Note
2.0 ±0.25 Typical
Stud Size #10
7.0" Long Teflon Tubing, 0.042" ID (Cut off drain wire at probe end of shield).
8 twisted pairs 24 AWG, stranded, insulated, tinned copper conductors, 200°C, 300 volts, with overall braid of 34 AWG tinned copper, 90% coverage and 24 AWG tinned copper, uninsulated drain wire.
3.875 ±0.10
4.625 ±0.10
5.375 ±0.10
6.125 ±0.10
Ferrule, Uninsulated
7.25 ±0.10
9.25 ±0.10
Overall Cable Length By Customer 150' Maximum
#1
#2
Heat Shrink Tubing 1" Long, 3/16" Size
DETAIL A
(typical on both ends of wiring)
HEATER WIRING OR CABLE
ELECTRONICS END
PROBE END
3/4 NPT Hub Size, Liquid-tight Strain Relief Connectors
4.0 ±0.10
Heat Shrink Tubing 2" Long, 1/2" Size
Heat Shrink Tubing 2" Long, 1/2" Size
5.5 ±0.10
Ferrule, Uninsulated
Strip Wire Ends 3/16" Typical
0.5 Typ.
Green, 16 AWG
2.0 ±0.25 Typical
Green, 16 AWG
Stud Size #6
Stud Size #10
4.25" Long Teflon Tubing, 0.042" ID. (Cut off drain wire at probe end of shield).
4.5 ±0.10
8 Conductors, 16 AWG, Stranded, 200°C, 600 volts.
Braided shield - tinned copper, 90% coverage with 18 AWG 24 tinned copper, uninsulated, drain wire.
37390061

PNEUMATIC INSTALLATION

Pneumatic system connections depend on whether reference air set, calibration solenoids, and/or blowback equipment options are equipped on your transmitter. Refer to the following paragraphs and select the option that applies to your transmitter configuration.

Reference Air Set Option (only)

When no options or only the reference air set option is equipped, use the following procedure to install the pneumatic system components.

1. Refer to Figure 2-8. Connect the reference air set (regulator/filter and pressure gage) to the instrument air inlet on the electronics housing and to the inlet side of the dilution air flow meter.
2. Connect the dilution air flow meter output to the dilution air inlet fitting on the sensor housing.
3. Install an air line between the instrument air outlet fitting on the electronics housing and the tee fitting on the sensor housing.

.

⚠CAUTION

Do not use 100% nitrogen as an O_2 low gas. It is suggested that O_2 low gas be between 0.4% and 2.0% O_2. Do not use gases with hydrocarbon concentrations of more than 40 parts per million. Failure to use proper gases will result in erroneous readings.

4. One CO gas and two O_2 gases are used to calibrate the OCX 8800:

   CO - 1000 ppm or 4%
   O_2 low gas - 0.4%
   O_2 high gas - 8%

   Connect the output of the test gas sources to the inlet port of the CAL GAS flow meter. Install an air line between the flow meter outlet port and the CAL GAS inlet fitting on the sensor housing.

Figure 2-8. Pneumatic Installation, OCX with Reference Air Set (without Autocalibration)

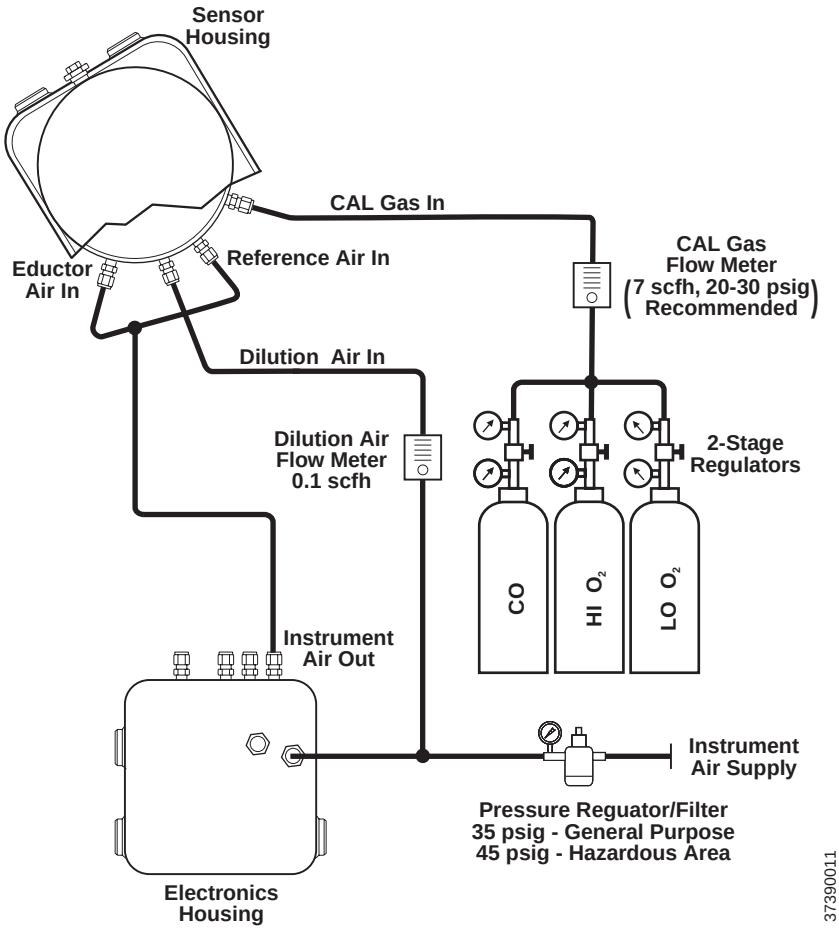
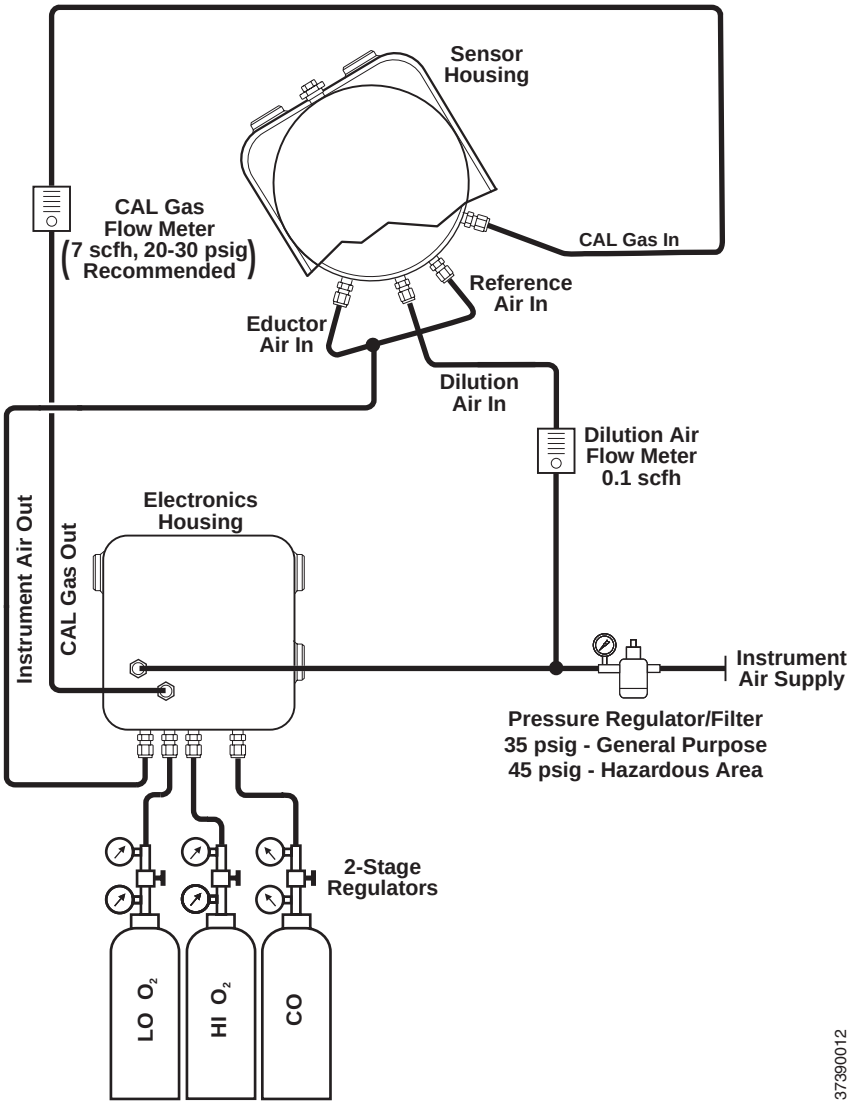


Figure 2-9. Pneumatic Installation, OCX with Reference Air Set and Solenoids (with Autocalibration)



Reference Air Set and Solenoids Option

When the reference air set and test gas solenoids are included with your OCX 8800, use the following procedure to install the pneumatic system components.

1. Install the reference air set according to the instructions in Reference Air Set Option, steps 1 through 3.
2. Refer to Figure 2-9. Connect the O_2 low gas source to the CAL GAS LO O_2 inlet fitting on the electronics housing. Install a shutoff valve and pressure regulator with gage in the O_2 low supply line, as shown.
3. Connect the O_2 high gas source to the CAL GAS HI O2 inlet fitting. Install a shutoff valve and pressure regulator with gage in the O_2 high supply line.

4. Connect the CO high gas to the CAL GAS HI COe inlet fitting. Install a shutoff valve and pressure regulator with gage in the CO high supply line.
5. Connect the CAL GAS outlet fitting of the electronics housing to the inlet port of the CAL GAS flow meter. Install an air line between the flow meter outlet port and the CAL GAS inlet fitting on the sensor housing.

Reference Air Set, Solenoids, and Blowback Option

The blowback system blows instrument air back through the blowback filter and out the sample tube of the transmitter. This removes built up dirt and particulate from the filter and sample line. The blowback option is normally used in systems that have a dirty process stream.

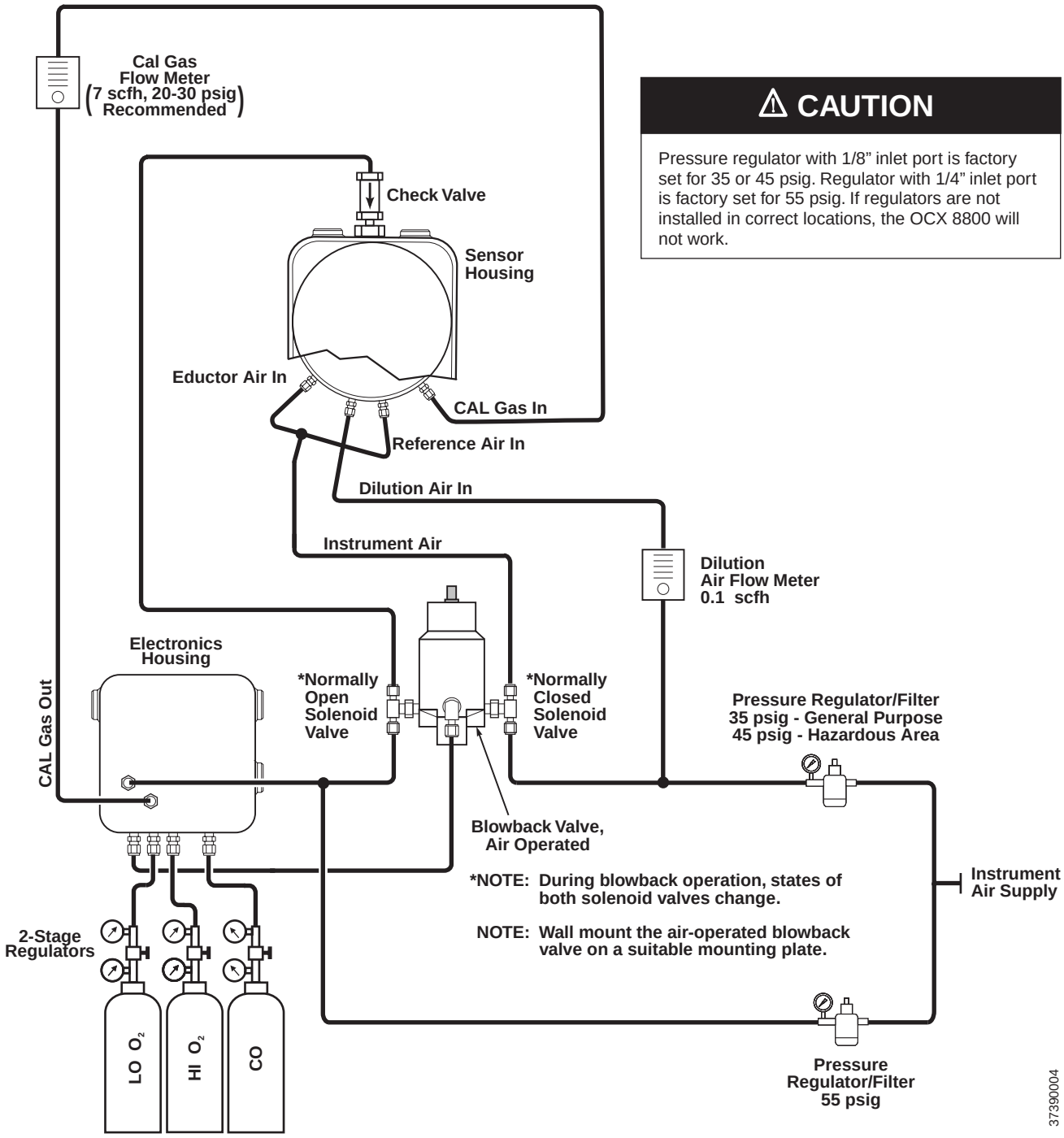
Installing an OCX 8800 with the blowback option requires the addition of air operated blowback valve, regulator and gage, and check valve.

Figure 2-10 shows the piping arrangement for the OCX 8800 with the blowback and autocalibration options. Figure 2-11 shows the piping arrangement for the OCX 8800 with the blowback option, but without autocalibration (without test gas solenoids).

When the reference air set, calibration gas solenoids, and blowback options are included with your transmitter, use the following procedure to install the pneumatic system components.

1. Connect the calibration gas sources according to the instructions in the previous paragraph “Reference Air Set and Solenoids Option”, steps 2 through 5.
2. Connect a clean, dry, instrument-quality supply of air (20.95% O_2) to the 35/45 psig and 55 psig pressure regulators. The inlet to the 35/45 psig regulator accepts a 1/8" NPT fitting. The inlet to the 55 psig regulator accepts a 1/4" NPT fitting.
3. See the upper leg of the instrument air supply. Connect the output of the 35/45 psi regulator/filter to one port of the normally-closed air-operated solenoid valve, and to the inlet side of the dilution air flow meter.
4. Connect the dilution air flow meter output to the DILUTION AIR inlet fitting on the sensor housing.
5. Install an instrument air line between the open port of the normally-open air-operated solenoid valve and the tee fitting on the sensor housing.
6. Connect the output of the 55 psi regulator/filter to one port of the normally-open air-operated solenoid valve, and to the instrument air inlet on the back of the electronics housing.
7. Install an air line between the open port of the normally-closed air-operated solenoid valve and the check valve inlet fitting on the sensor housing.

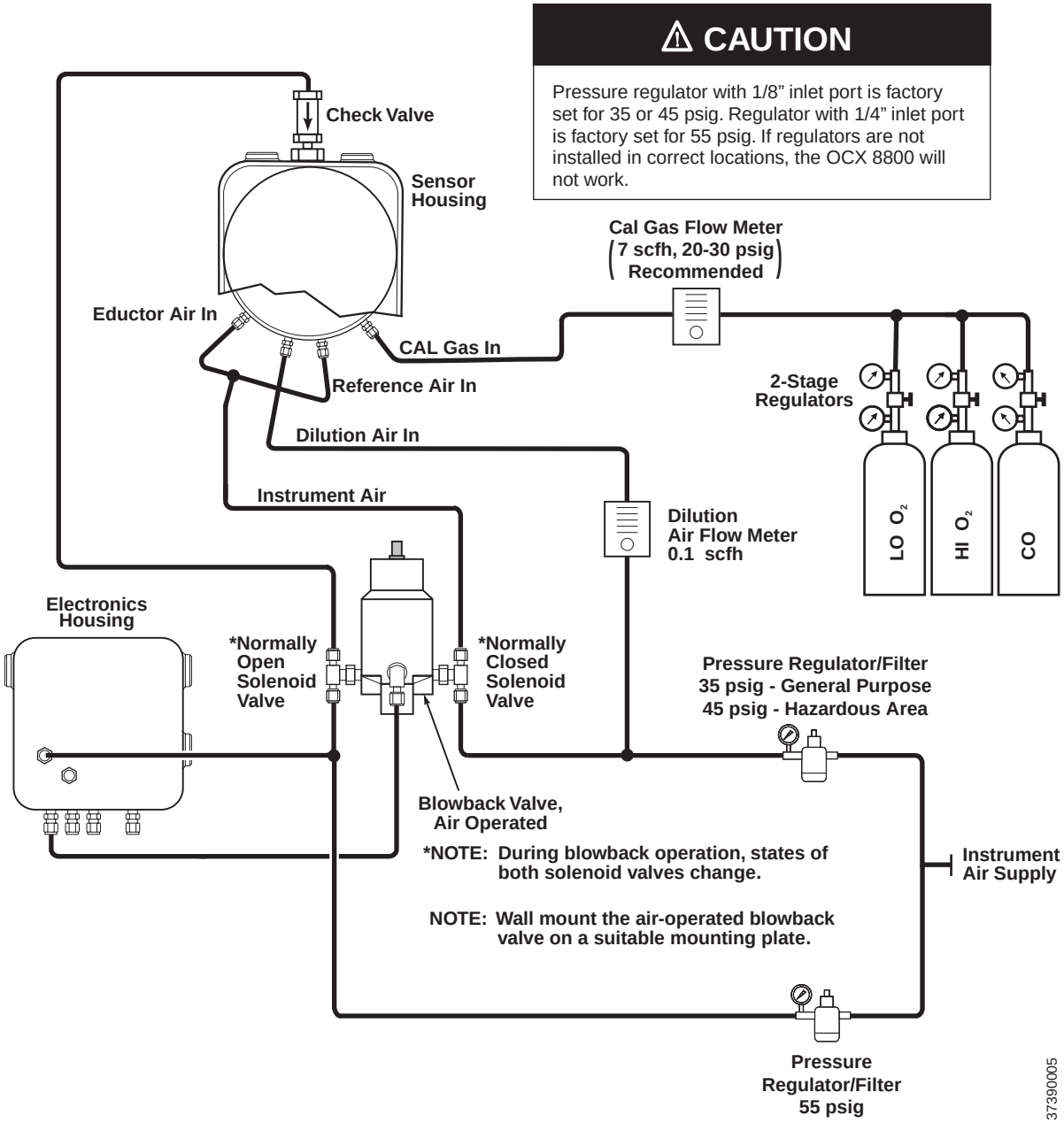
Figure 2-10. Piping Arrangement,
Blowback with Autocalibration



⚠ CAUTION

Pressure regulator with 1/8” inlet port is factory set for 35 or 45 psig. Regulator with 1/4” inlet port is factory set for 55 psig. If regulators are not installed in correct locations, the OCX 8800 will not work.

Figure 2-11. Piping Arrangement,
Blowback without Autocalibration


⚠ CAUTION
Pressure regulator with 1/8" inlet port is factory set for 35 or 45 psig. Regulator with 1/4" inlet port is factory set for 55 psig. If regulators are not installed in correct locations, the OCX 8800 will not work.
Check Valve
Sensor Housing
Cal Gas Flow Meter
(7 scfh, 20-30 psig Recommended)
Eductor Air In
CAL Gas In
Reference Air In
2-Stage Regulators
Dilution Air In
Instrument Air
Dilution Air Flow Meter 0.1 scfh
LO O2
HI O2
CO
Electronics Housing
*Normally Open Solenoid Valve
*Normally Closed Solenoid Valve
Pressure Regulator/Filter
35 psig - General Purpose
45 psig - Hazardous Area
Blowback Valve, Air Operated
*NOTE: During blowback operation, states of both solenoid valves change.
Instrument Air Supply
NOTE: Wall mount the air-operated blowback valve on a suitable mounting plate.
Pressure Regulator/Filter 55 psig
37390005

8. Install an air line between the instrument air outlet fitting on the electronics housing and the control air inlet fitting on the air-operated solenoid valve.
9. There are three settings that need to be specified to set up the blowback option. These are the blowback interval, duration, and purge time.

   Interval - Length of time between blowback events.
   (60 minutes recommended.)

   Duration - Length of time blowback air is activated.
   (5 seconds recommended.)

   Purge - Length of time after blowback is complete before oxygen/combustibles readings are considered valid.
   (Set as required by the application.)

   These settings are available through HART from the **DEVICE SETUP** > **DETAILED SETUP** > **OUTPUT CONDITIONS** > **BLOWBACK** menu.

INITIAL STARTUP

Observe the following Caution and Note. Refer to Section 3: Configuration and Startup, for OCX 8800 startup information.

⚠CAUTION

Upon completing installation, make sure that the OCX 8800 is turned on and operating prior to firing up the combustion process. Damage can result from having a cold OCX 8800 exposed to the process gases.

If ducts will be washed down during outages, make sure to power down the OCX 8800 units and remove them from the wash area.

NOTE
During outages, and whenever possible, leave OCX 8800 units running to prevent condensation and premature aging from thermal cycling.

Section 3 Configuration and Startup

Verify Installation . . . . . **page 3-1**
Initial Power Up . . . . . **page 3-3**
Set Test Gas Values . . . . . **page 3-4**
OCX 8800 Reset Procedure . . . . . **page 3-4**

⚠WARNING

Install all protective equipment covers and safety ground leads after installation. Failure to install covers and ground leads could result in serious injury or death.

VERIFY INSTALLATION

Ensure the OCX 8800 is installed correctly. Vertify mechanical installation and all electrical and pneumatic connections. Refer to Section 2, Installation.

⚠CAUTION

Make sure that the OCX 8800 is turned on and operating prior to firing up the combustion process. Damage can result from having a cold OCX 8800 exposed to the process gases.

NOTE
During outages, and whenever possible, leave all OCX 8800 units running to prevent condensation and premature aging from thermal cycling.

Verify Configuration

There are three switches on the microprocessor board which are user configurable for the OCX 8800 (Figure 3-1). SW1 determines if the O_2 4-20 mA signal is internally or externally powered. SW2 determines if the COe 4-20 mA signal is internally or externally powered. SW3 sets the rail limits for the O_2 and COe 4-20 mA signals and configures the sample line heater control circuit. All switches are accessible through holes in the electronics box.

⚠CAUTION

Remove power from the OCX 8800 before changing defaults. If defaults are changed under power, damage to the electronics may occur.

Verify that the following switch settings are correct for your OCX 8800 installation:

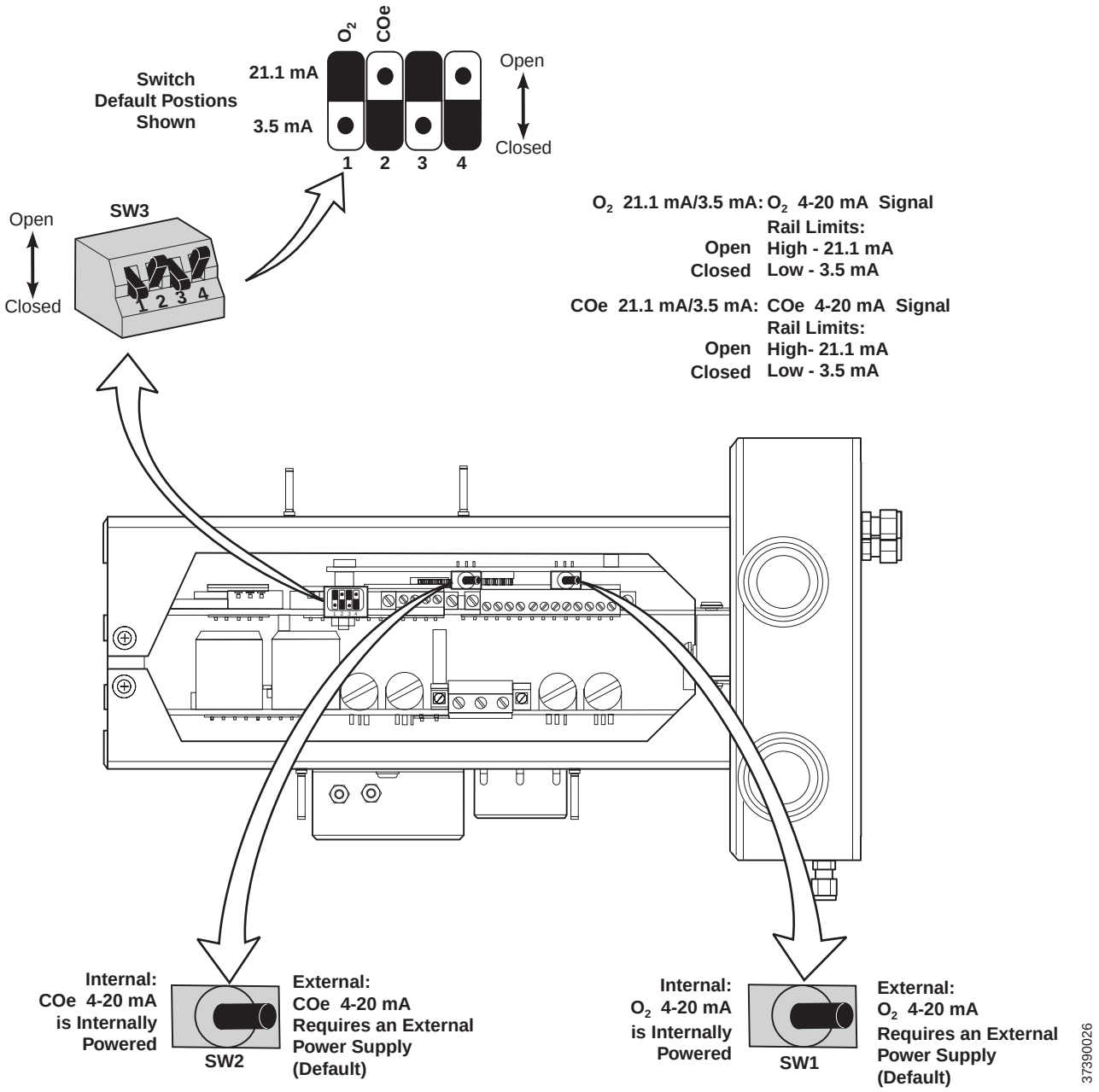
SW1 The two settings are internally or externally powering the O_2 4-20 mA signal. The factory setting is for the O_2 4-20 mA signal to be externally powered.

SW2 The two settings are internally or externally powering the COe 4-20 mA signal. The factory setting is for the COe 4-20 mA signal to be externally powered.

SW3 The factory sets this switch as follows:

- Position 1 determines the O_2 4-20 mA signal rail limit. The settings are high, 21.1 mA, or low, 3.5 mA. The factory setting is low, 3.5 mA.
- Position 2 determines the COe 4-20 mA signal rail limit. The settings are high, 21.1 mA, or low, 3.5 mA. The factory setting is high, 21.1 mA.
- Positions 3 and 4 must be set as shown for proper software control of the device heaters.

Figure 3-1. OCX 8800 Defaults



INITIAL POWER UP

Allow adequate time (approximately 60 minutes) for the heaters to begin operation and for the OCX 8800 to reach normal operating temperature on power up. Normal operating temperature for the O_2 cell is 736°C. Normal operating temperature for the combustibles cell is 300°C. The normal sample line temperature is 170°C.

SET TEST GAS VALUES

Use HART/AMS to set test gas values for calibration. Refer to Section 4, Using HART Communications for more information.

Setting Test Gas Values with HART

1. Use the HART communicator or AMS software to access the HART menu.
2. From the **DETAILED SETUP** menu, select **O2 CALIB PARAMS**.
3. From **O2 CALIB PARAMS**, select **O2 High Gas**. Enter the percent O_2 used for the high O_2 test gas.
4. From **O2 CALIB PARAMS**, select **Low TG**. Enter the percent O_2 used for the low O_2 test gas.
5. From the **DETAILED SETUP** menu, select **COe CALIB PARAMS**.
6. From **COe CALIB PARAMS**, select **COe Test Gas**. Enter the CO concentration (ppm) used for COe test gas.

OCX 8800 RESET PROCEDURE

Whenever you correct an equipment alarm or fault condition, the OCX 8800 will either revert to normal operation or continue to indicate an alarm status condition. If the equipment does not revert to normal operation when a fault condition is cleared, or if instructed to do so in Section 7, Troubleshooting, use the following procedure to reset the OCX 8800.

OCX Reset with HART

Remove the OCX 8800 from the process loop and recycle power.

Section 4 Using HART Communications

Overview . . . . . **page 4-1**
HART Communicator Signal Connections . . . . . **page 4-1**
HART Communicator PC Connections . . . . . **page 4-4**
HART Menu Tree . . . . . **page 4-5**
D/A Trim Procedures . . . . . **page 4-9**

OVERVIEW

The HART communicator is a handheld communications interface device. It provides a common communications link to all microprocessor-based instruments that are HART compatible. The handheld communicator contains an 8 x 21 character liquid crystal display (LCD) and 25 keys. A pocket-sized manual, included with the HART communicator, details the specific functions of all the keys.

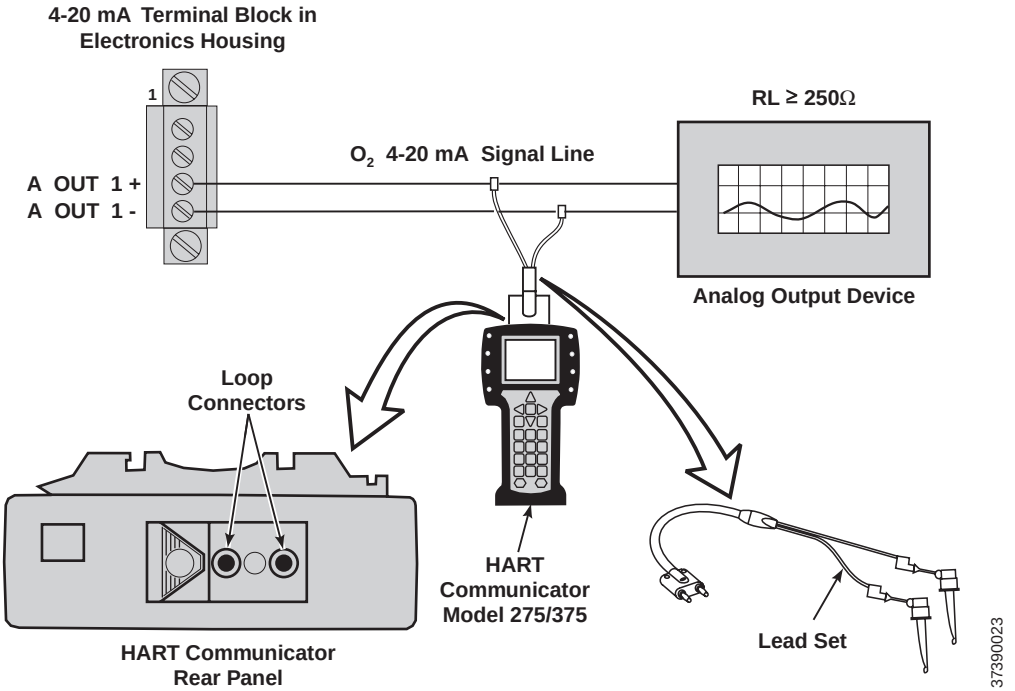
To interface with the OCX 8800, the HART communicator requires a termination point along the O_2 4-20 mA current loop and a minimum load resistance of 250 ohms between the communicator and the power supply. The HART communicator accomplishes its task using a Frequency Shift Keying (FSK) technique. With the use of FSK, high-frequency digital communication signals are superimposed on the 4-20 mA oxygen output signal. The communicator does not disturb the 4-20 mA signal since no net energy is added to the loop. HART information is not available on the COe output signal.

The HART communicator may be interfaced with a personal computer (PC), providing special software has been installed. To connect the HART communicator to a PC, an interface adapter is required. Refer to the proper HART communicator documentation in regard to the PC interface option.

HART COMMUNICATOR SIGNAL CONNECTIONS

The HART communicator can connect to the OCX 8800 oxygen analog output signal line at any wiring termination in the O_2 4-20 mA current loop. There are two methods of connecting the HART communicator to the signal line. For applications in which the signal line has a load resistance of 250 ohms or more, refer to method 1. For applications in which the signal line load resistance is less than 250 ohms, refer to method 2.

Figure 4-1. Signal Line Connections,
≥ 250 Ohms Load Resistance



Method 1, for Load Resistance ≥ 250 Ohms

Refer to Figure 4-1 and the following steps to connect the HART communicator to a signal line 250 ohms or more of load resistance.

⚠WARNING

Do not make connections to the HART communicator's serial port, 4-20 mA signal lines, or NiCad recharger jack in an explosive atmosphere. Explosions can result in death or serious injury.

Using the supplied lead set, connect the HART communicator in parallel to the OCX 8800. Use any wiring termination points in the oxygen analog output 4-20 mA signal line.

Method 2, for Load Resistance < 250 Ohms

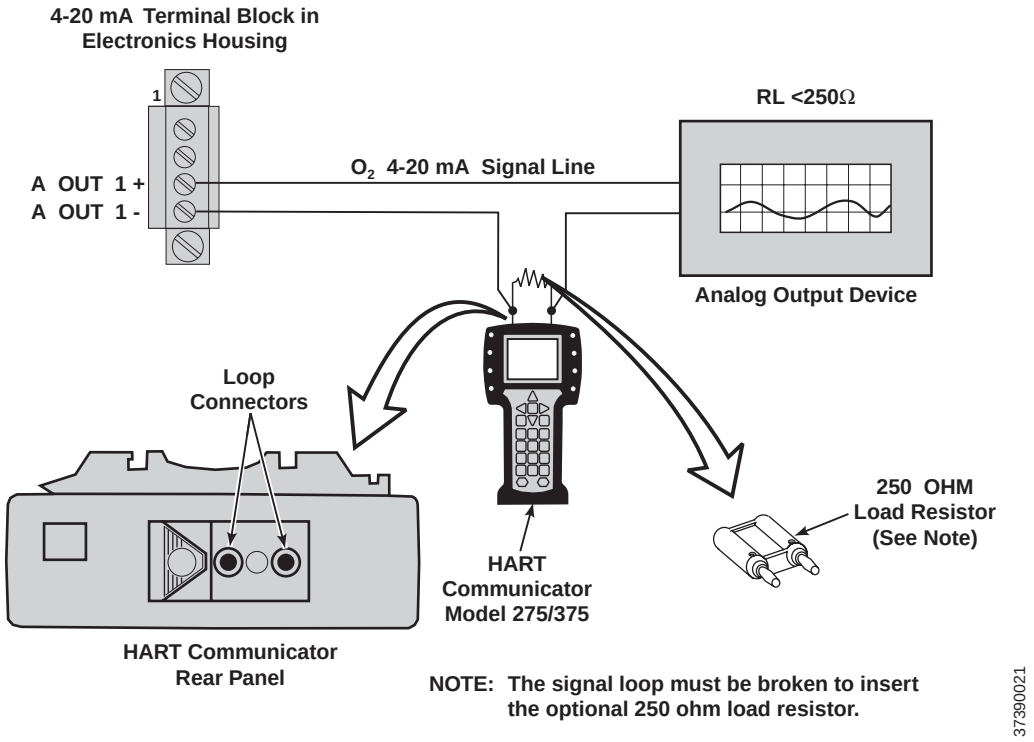
Refer to Figure 4-2 and the following steps to connect the HART communicator to a signal line with less than 250 ohms load resistance.

⚠WARNING

Do not make connections to the HART communicator's serial port, 4-20 mA signal lines, or NiCad recharger jack in an explosive atmosphere. Explosions can result in death or serious injury.

1. At a convenient point, break the oxygen analog output 4-20 mA signal line and install the optional 250 ohm load resistor.
2. Plug the load resistor into the loop connectors (located on the rear panel of the HART communicator).

Figure 4-2. Signal Line Connections, < 250 Ohms Load Resistance


4-20 mA Terminal Block in Electronics Housing
1
A OUT 1 +
A OUT 1 -
O2 4-20 mA Signal Line
RL <250Ω
Analog Output Device
Loop Connectors
HART Communicator Model 275/375
250 OHM Load Resistor (See Note)
HART Communicator Rear Panel
NOTE: The signal loop must be broken to insert the optional 250 ohm load resistor.
37390021

HART COMMUNICATOR PC CONNECTIONS

There is an option to interface the HART communicator with a personal computer. Load the designated AMS software into the PC. Then link the HART communicator to the PC using the interface PC adapter that connects to the serial port (on the communicator rear panel). Refer to the proper HART communicator documentation in regard to the PC interface option.

Off-line and On-line Operations

The HART communicator can be operated both off-line and on-line.

Off-line operations are those in which the communicator is not connected to the OCX 8800. Off-line operations can include interfacing the HART communicator with a PC. (Refer to applicable HART documentation regarding HART/PC applications.)

In the on-line mode, the communicator is connected to the oxygen 4-20 mA analog output signal line. The communicator is connected in parallel to the OCX 8800 or in parallel to the 250 ohm load resistor.

The opening menu displayed on the LCD is different for on-line and off-line operations. When powering up a disconnected (off-line) communicator, the LCD will display the Main Menu. When powering up a connected (on-line) communicator, the LCD will display the On-line Menu. Refer to the HART communicator manual for detailed menu information.

HART MENU TREE

This section consists of a menu tree for the HART communicator. This menu is specific to OCX 8800 applications.

Figure 4-3. HART Menu Tree
(Sheet 1 of 4)

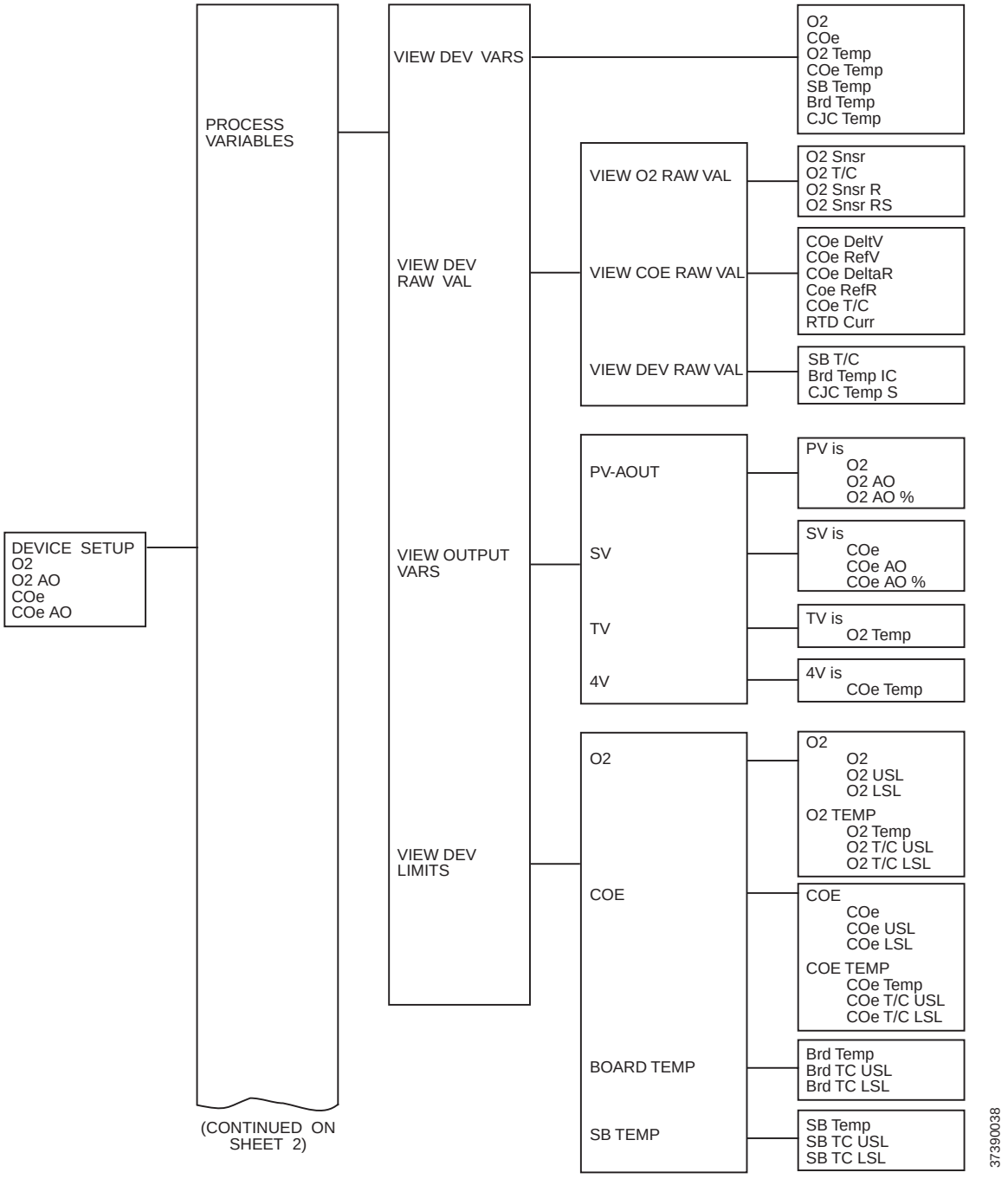


Figure 4-3. HART Menu Tree (Sheet 2 of 4)

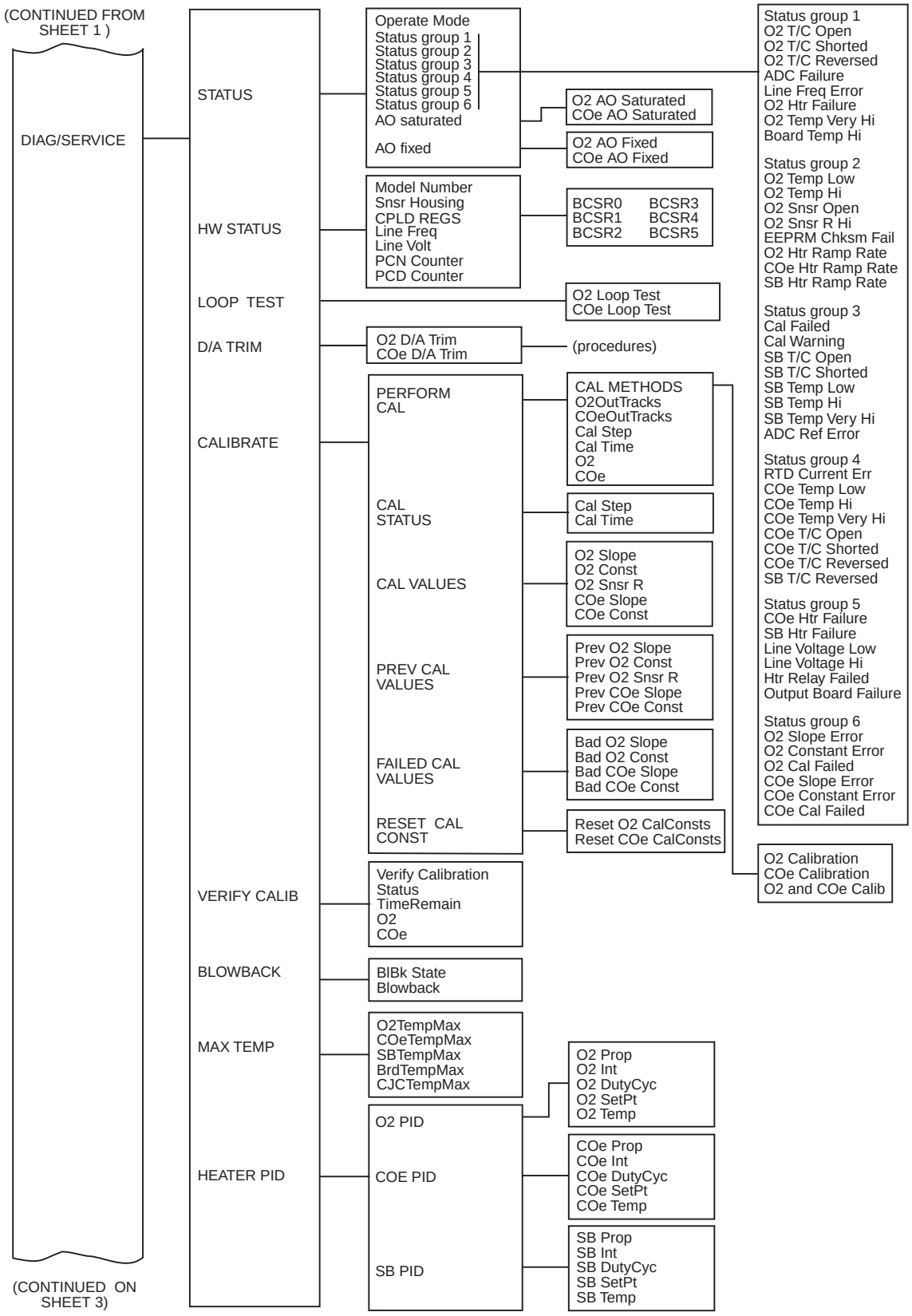


Figure 4-3. HART Menu Tree
(Sheet 3 of 4)

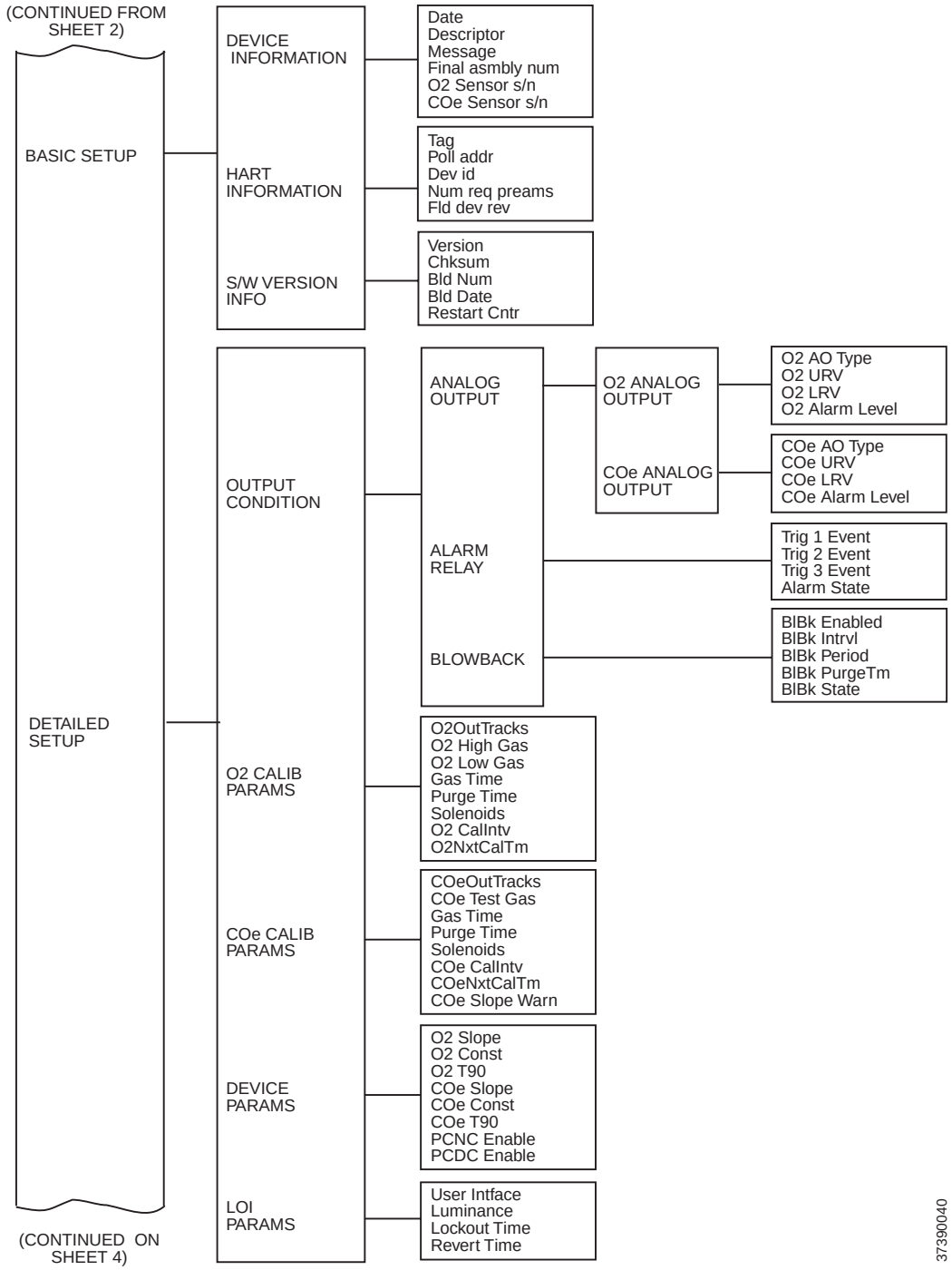
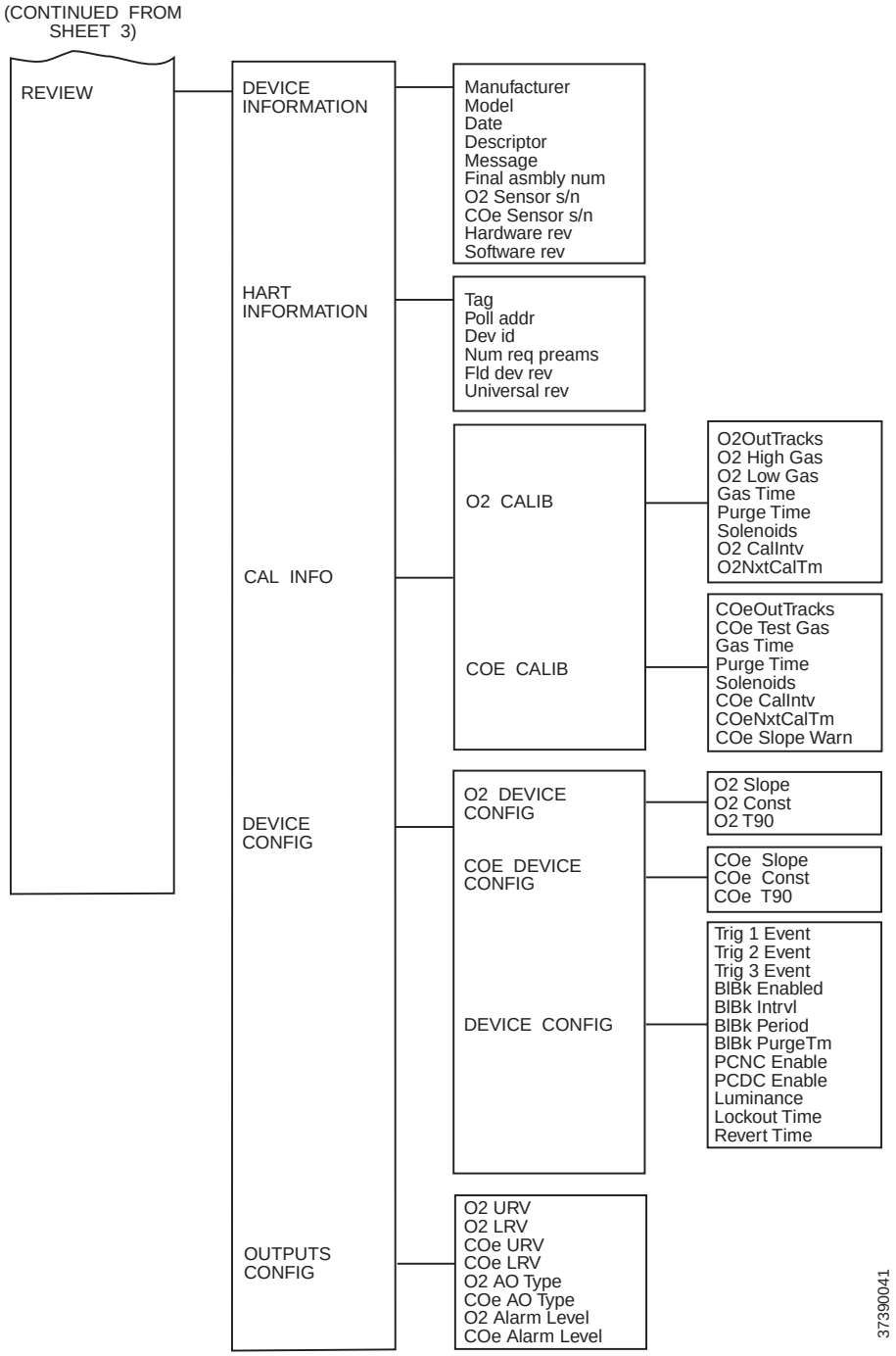


Figure 4-3. HART Menu Tree
(Sheet 4 of 4)



D/A TRIM PROCEDURES

O_2 D/A trim procedure using HART/AMS

Use the following procedure to perform the O_2 D/A trim procedure using the HART communicator or AMS. Refer to the HART menu tree, Figure 4-3.

NOTE
To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

1. From the **DIAG/SERVICE** menu, select **D/A TRIM**. The HART communicator displays **O2 D/A Trim**.
2. Press the right arrow key to start the procedure. (If you wish to exit D/A Trim with no changes, select **ABORT**.)
3. The HART communicator displays **WARNING: Loop should be removed from automatic control**. Remove the OCX 8800 from any automatic control loops to avoid a potentially dangerous operating condition and press **OK**.
4. Remove the electronics housing cover.
5. Refer to Figure 2-5. Connect a digital multimeter to read the milliamp output from the O_2 D/A coverter circuit. Connect the positive lead to the AOUT1+ terminal and connect the negative lead to the AOUT1- terminal. Then, press **OK** at the HART communicator.
6. The HART communicator displays **Setting Fld dev output to 4 mA**. Press **OK**. Read the O_2 millamp output at the digital multimeter. Enter the reading at the HART communicator and press **ENTER**. (Select **ABORT** to exit without changes).
7. The HART communicator displays **Setting Fld dev output to 20 mA**. Press **OK**. Read the O_2 millamp output at the digital multimeter. Enter the reading at the HART communicator and press **ENTER**. (Select **ABORT** to exit without changes).
8. The HART communicator displays **Setting Fld dev output to 4 mA**. Press **OK**.
9. The HART communicator displays **Fld dev output 4.00 mA equal to reference meter?** Using the up or down arrow, select **1 Yes** or **2 No** and Press **ENTER**. If **No**, the process repeats from step 6.
10. The HART communicator displays **Setting Fld dev output to 20 mA**. Press **OK**.
11. The HART communicator displays **Fld dev output 20.00 mA equal to reference meter?** Using the up or down arrow, select **1 Yes** or **2 No** and Press **ENTER**. If **No**, the process repeats from step 7.
12. The HART communicator displays **NOTE: Loop may be returned to automatic control**.

COe D/A trim procedure using HART/AMS

Use the following procedure to perform the COe D/A trim procedure using the HART communicator or AMS. Refer to the HART menu tree, Figure 4-3.

NOTE
To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

1. From the **DIAG/SERVICE** menu, select **D/A TRIM**. The HART communicator displays **O2 D/A Trim**. Press the up or down arrow to select **COe D/A Trim**.
2. Press the right arrow key to start the procedure. (If you wish to exit D/A Trim with no changes, select **ABORT**.)
3. The HART communicator displays **WARNING: Loop should be removed from automatic control**. Remove the OCX 8800 from any automatic control loops to avoid a potentially dangerous operating condition and press **OK**.
4. Remove the electronics housing cover.
5. Refer to Figure 2-5. Connect a digital multimeter to read the milliamp output from the COe D/A coverter circuit. Connect the positive lead to the AOUT2+ terminal and connect the negative lead to the AOUT2- terminal. Then, press **OK** at the HART communicator.
6. The HART communicator displays **Setting Fld dev output to 4 mA**. Press **OK**. Read the COe millamp output at the digital multimeter. Enter the reading at the HART communicator and press **ENTER**. (Select **ABORT** to exit without changes).
7. The HART communicator displays **Setting Fld dev output to 20 mA**. Press **OK**. Read the COe millamp output at the digital multimeter. Enter the reading at the HART communicator and press **ENTER**. (Select **ABORT** to exit without changes).
8. The HART communicator displays **Setting Fld dev output to 4 mA**. Press **OK**.
9. The HART communicator displays **Fld dev output 4.00 mA equal to reference meter?** Using the up or down arrow, select **1 Yes** or **2 No** and Press **ENTER**. If **No**, the process repeats from step 6.
10. The HART communicator displays **Setting Fld dev output to 20 mA**. Press **OK**.
11. The HART communicator displays **Fld dev output 20.00 mA equal to reference meter?** Using the up or down arrow, select **1 Yes** or **2 No** and Press **ENTER**. If **No**, the process repeats from step 7.
12. The HART communicator displays **NOTE: Loop may be returned to automatic control**.

Section 5 Calibration

Overview . . . . . **page 5-1**
Fully Automatic Calibration . . . . . **page 5-1**
Operator - Initiated Autocalibration . . . . . **page 5-3**
Manual Calibration . . . . . **page 5-3**

OVERVIEW

During a calibration, two calibration gases with known O_2 concentrations and one calibration gas with a known COe concentration are applied to the OCX 8800. Slope and constant values are calculated to determine if the OCX 8800 is correctly measuring net concentrations of O_2 and combustibles in the industrial process.

Before calibrating the OCX 8800, verify that the calibration gas parameters are correct by setting the test gas values used when calibrating the unit. Refer to Section 3, Configuration and Startup.

There are three calibration methods available to the OCX 8800; automatic, operator-initiated automatic, and manual. Calibration commands and menus can be accessed by HART/AMS.

FULLY AUTOMATIC CALIBRATION

If the OCX 8800 is equipped with calibration solenoids, the unit can be programmed to automatically calibrate without any operator action. Refer to the following paragraphs for using HART/AMS to set up the OCX 8800 for fully automatic calibration.

Autocalibration Setup using HART

NOTE
Automatic calibration is only available on units equipped with calibration solenoids.

Use the following procedure to specify a time interval (in hours) at which the OCX 8800 will automatically calibrate.

1. From the **DEVICE SETUP** screen, select **DETAILED SETUP**.
2. From the **DETAILED SETUP** screen, select **O2 CALIB PARAMS** or **COE CALIB PARAMS**.
3. If the unit is equipped with calibration solenoids and timed automatic calibrations are desired, select **Solenoids**, then select **Y**es. Selct **N**o to disable the calibration solenoids.

4. Select **O2 CalIntrvl** (O_2 calibration interval) and enter the desired time in hours between automatic O_2 calibrations. Select **COE CalIintrvl** and enter the desired time between automatic COe calibrations. To disable automatic calibration for O_2 and COe, enter 0 for both **CalIntrvl** parameters.
5. If desired, the **O2NxtCalTm** and the **COeNxtCalTm** (next calibration time) parameters can be changed to synchronize a calibration at a specific day or time.

⚠CAUTION

When setting automatic calibration times, CalIntrvl and NxtCalTm should be set so that O_2 and COe are NOT calibrated simultaneously.

NOTE
To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

6. From the **O2 CALIB PARAMS** screen, select **CalIntrvl**.
7. At the prompt, input a time interval (in hours) at which an automatic O_2 calibration will occur and press **ENTER**.
8. From the **DETAILED SETUP** screen, select **COE CALIB PARAMS**.
9. From the **COE CALIB PARAMS** menu, select **CalIntrvl**.
10. At the prompt, input a time interval (in hours) at which an automatic COe calibration will occur and press **ENTER**.

OPERATOR - INITIATED AUTOCALIBRATION

An operator can initiate an automatic calibration at any time provided that the unit is equipped with calibration solenoids.

Autocalibration using HART

To initiate an automatic calibration using HART/AMS, perform the following steps on the HART menu tree. Refer to Section 4, Using HART Communications, for the HART menu tree.

1. Select **DIAG/SERVICE** from **DEVICE SETUP** menu.
2. Select **CALIBRATE** from the **DIAG/SERVICE** menu.
3. Select **PERFORM CAL** from the **CALIBRATE** menu.
4. Select **CAL METHODS** from the **PERFORM CAL** menu.
5. From the **CAL METHODS** menu, select the type of calibration desired: **O2 Calibration**, **COe Calibration**, or **O2 and COe Calibration**.

MANUAL CALIBRATION

If a unit is not equipped with calibration solenoids, a calibration must be performed by an operator following prompts from the unit. Refer to the following paragraphs for manual calibration.

Manual O_2 Calibration using HART

To perform a manual O_2 calibration using the HART communicator or AMS, use the following procedure. If necessary, refer to Section 4, Using HART Communications, for the HART menu tree.

NOTE
To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

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1. From the **DIAG/SERVICE** menu, select **CALIBRATION**. From the **CALIBRATION** menu, select **PERFORM CAL**.
2. From the **PERFORM CAL** menu, select **CAL METHODS**. Select **O2 CALIBRATION** to start O_2 calibration.
3. In the first O_2 Calibration screen, a **Loop should be removed from automatic control** warning appears. Remove the OCX 8800 from any automatic control loops to avoid a potentially dangerous operating condition and press **OK**.
4. The main Calibration screen should look like the following. Press **OK** to continue.

   OCX: TAG NAME
   STATUS: Idle
   TIME REMAIN: 0s
   O2: 0.4 %, 85.95mV
   OK/NEXT to Select
   ABORT/CANCEL to Exit

5. From the **SELECT ACTION** screen, select **START/NEXT CALSTEP** to continue calibration, select **ABORT CAL** to abort calibration or **EXIT CAL** to exit calibration. Select one item from the list and press **ENTER**.
   OCX: TAG NAME
   SELECT ACTION
   1. START/NEXT CALSTEP
   2. ABORT CAL
   3. EXIT CAL
6. When the Calibration Status is at the **AppO2Low** step, switch on O_2 Low Gas. Verify the O_2 concentration measured matches the **O2 LOW GAS** parameter in the Setup. Press **OK** when ready.
7. Select **Start/Next Cal Step** to start applying the O_2 Low Gas. The time to apply the test gas is specified by the **Gas Time**.
8. The Calibration Status should be automatically changed to **FlowO2Low** and then **ReadO2Low** for a period of time. During this period, if an attempt is made to go to the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
9. When ready, Calibration Status will stop at the **AppO2Hi**. Switch off the O_2 Low Gas and switch on the O_2 High Gas. Verify the O_2 concentration measured matches the **O2 HIGH GAS** parameter in the Setup. Press **OK** when ready.
10. Select **Start/Next Cal Step** to start applying the O_2 High Gas. The time to apply the test gas is specified by the **Gas Time**.
11. The Calibration Status should be automatically changed to **FlowO2Hi** and then **ReadO2Hi** for a period of time. During this period, if an attempt is made to go the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
12. When ready, Calibration Status will stop at **STOP GAS**. Switch off the O_2 High Gas. Press **OK** when ready. Select **Start/Next Cal Step** to start purging gas. The time to purge gas is specified by the **Purge Time**.
13. When the **Purge** step is complete, the Calibration Status will be at **IDLE** if the calibration is successful or **CAL RECOMMENDED** if the calibration has failed. A Calibration Failed alarm will be set if the calibration has failed.
14. When calibration is complete. Select **Exit Cal** to exit the calibration method.

Manual COe Calibration using HART

To perform a manual COe calibration using the HART communicator or AMS, use the following procedure. If necessary, refer to Section 4, Using HART Communications, for the HART menu tree.

NOTE
To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

1. From the **DIAG/SERVICE** menu, select **CALIBRATION**. From the **CALIBRATION** menu, select **PERFORM CAL**.
2. From the **PERFORM CAL** menu, select **CAL METHODS**. Select **COe CALIBRATION** to start COe calibration.
3. In the first COe Calibration screen, a **Loop should be removed from automatic control** warning appears. Remove the OCX 8800 from any automatic control loops to avoid a potentially dangerous operating condition and press **OK**.
4. The main Calibration screen should look like the following. Press **OK** to continue.
   OCX: TAG NAME
   STATUS: Idle
   TIME REMAIN: 0s
   COe: 0.20 ppm, 0.00 mV
   OK/NEXT to Select
   ABORT/CANCEL to Exit
5. From the **SELECT ACTION** screen, select **START/NEXT CALSTEP** to continue calibration, select **ABORT CAL** to abort calibration or **EXIT CAL** to exit calibration. Select one item from the list and press **ENTER**.
   OCX: TAG NAME
   SELECT ACTION
   1. START/NEXT CALSTEP
   2. ABORT CAL
   3. EXIT CAL
6. The unit samples reference air as the COe Low Gas. The Calibration Status should automatically change to **ReadCOLow** for a period of time. During this period, if an attempt is made to go to the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
7. When ready, Calibration Status will stop at the **AppCOeHi**. Switch on the COe High Gas. Verify the COe concentration measured matches the **COe HIGH GAS** parameter in the Setup. Press **OK** when ready.
8. Select **Start/Next Cal Step** to start applying the COe High Gas. The time to apply the test gas is specified by the **Gas Time**.

9. The Calibration Status should be automatically changed to **FlowCOeHi** and then **ReadCOeHi** for a period of time. During this period, if an attempt is made to go the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
10. When ready, Calibration Status will stop at **STOP GAS**. Switch off the COe High Gas. Press **OK** when ready. Select **Start/Next Cal Step** to start purging gas. The time to purge gas is specified by the **Purge Time**.
11. When the **Purge** step is complete, the Calibration Status will be at **IDLE** if the calibration is successful or **CAL RECOMMENDED** if the calibration has failed. A Calibration Failed alarm will be set if the calibration has failed.
12. When calibration is complete. Select **Exit Cal** to exit the calibration method.

Manual O_2 and COe Calibration using HART

To perform a manual O_2 and COe calibration using the HART communicator or AMS, use the following procedure. If necessary, refer to Section 4, Using HART Communications, for the HART menu tree.

NOTE
To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

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1. From the **DIAG/SERVICE** menu, select **CALIBRATION**. From the **CALIBRATION** menu, select **PERFORM CAL**.
2. From the **PERFORM CAL** menu, select **CAL METHODS**. Select **02 & COe CALIBRATION** to start O_2 and COe calibration.
3. In the first Calibration screen, a **Loop should be removed from automatic control** warning appears. Remove the OCX 8800 from any automatic control loops to avoid a potentially dangerous operating condition and press **OK**.
4. The main Calibration screen should look like the following. Press **OK** to continue.

   OCX: TAG NAME
   STATUS: Idle
   TIME REMAIN: 0s
   O2: 0.4 %, 85.95mV
   COe: 0.20 ppm, 0.00 mV
   OK/NEXT to Select
   ABORT/CANCEL to Exit

5. From the **SELECT ACTION** screen, select **START/NEXT CALSTEP** to continue calibration, select **ABORT CAL** to abort calibration or **EXIT CAL** to exit calibration. Select one from the list and press **ENTER**.
   OCX: TAG NAME
   SELECT ACTION
   1. START/NEXT CALSTEP
   2. ABORT CAL
   3. EXIT CAL
6. When the Calibration Status is at the **AppO2Low** step, switch on O_2 Low Gas. Verify the O_2 concentration measured matches the **O2 LOW GAS** parameter in **Setup**. Press **OK** when ready.
7. Select **Start/Next Cal Step** to start applying the O_2 Low Gas. The time to apply the test gas is specified by the **Gas Time**.
8. The Calibration Status should automatically change to **FlowO2Low** and then **ReadO2Low** for a period of time. During this period, if an attempt is made to go to the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
9. When ready, Calibration Status will stop at **AppO2Hi**. Switch off the O_2 Low Gas and switch on the O_2 High Gas. Verify the O_2 concentration measured matches the **O2 HIGH GAS** parameter in **Setup**. Press **OK** when ready.
10. Select **Start/Next Cal Step** to apply the O_2 High Gas. The time to apply the test gas is specified by the **Gas Time**.
11. The Calibration Status should automatically change to **FlowO2Hi**, then **ReadO2Hi**, and then **ReadCOeLo** for a period of time. During this period, if an attempt is made to go the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
12. When ready, Calibration Status will stop at **AppCOeHi**. Switch off the O_2 High Gas and switch on the COe Gas. Verify the COe concentration measured matches the **COe TEST GAS** parameter in the **Setup**. Press **OK** when ready.
13. Select **Start/Next Cal Step** to start applying the COe Gas. The time to apply the test gas is specified by the **Gas Time**.
14. The Calibration Status should automatically change to **FlowCOeHi** and then **ReadCOeHi** for a period of time. During this period, if an attempt is made to go the next calibration step by pressing **OK** and selecting **Start/Next Cal Step**, you will be prompted with **Operator step command is not accepted at this time**. The **Next Cal Step** command is not accepted at this time.
15. When ready, Calibration Status will stop at **STOP GAS**. Switch off the COe gas. Press **OK** when ready. Select **Start/Next Cal Step** to start purging gas. The time to purge gas is specified by **Purge Time**.

Section 6 Maintenance and Service

Overview . . . . . **page 6-1**
OCX 8800 Removal and Installation . . . . . **page 6-1**
Repair Sensor Housing . . . . . **page 6-8**
Repair Electronics Housing . . . . . **page 6-28**
Replace Tube Fittings . . . . . **page 6-34**

OVERVIEW

This section contains the procedures to maintain and service the OCX 8800.

⚠WARNING

Install all protective equipment covers and safety ground leads after equipment repair or service. Failure to install covers and ground leads could result in serious injury or death.

⚠WARNING

It is recommended that the OCX 8800 be removed from the stack for all service activities. The unit should be allowed to cool and be taken to a clean work area. Failure to comply may cause severe burns.

⚠WARNING

Disconnect and lock out power before working on any electrical components. There may be voltage up to 264 VAC.

OCX 8800 REMOVAL AND INSTALLATION

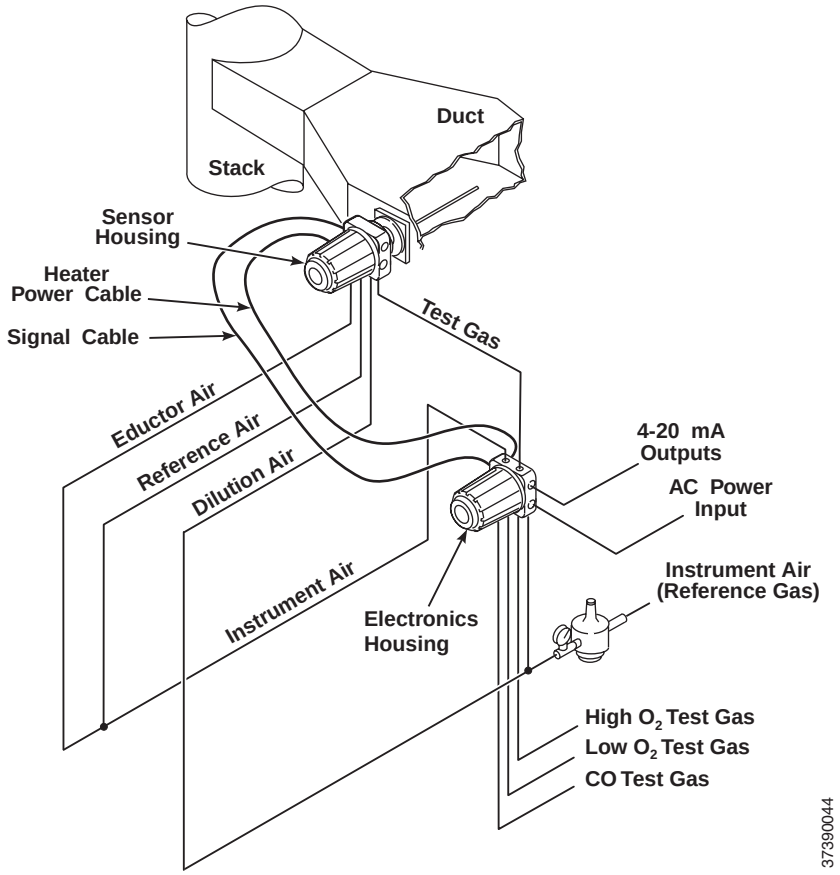
Use the following procedures to remove or install the OCX 8800.

OCX with Remote Electronics

Remove Sensor Housing

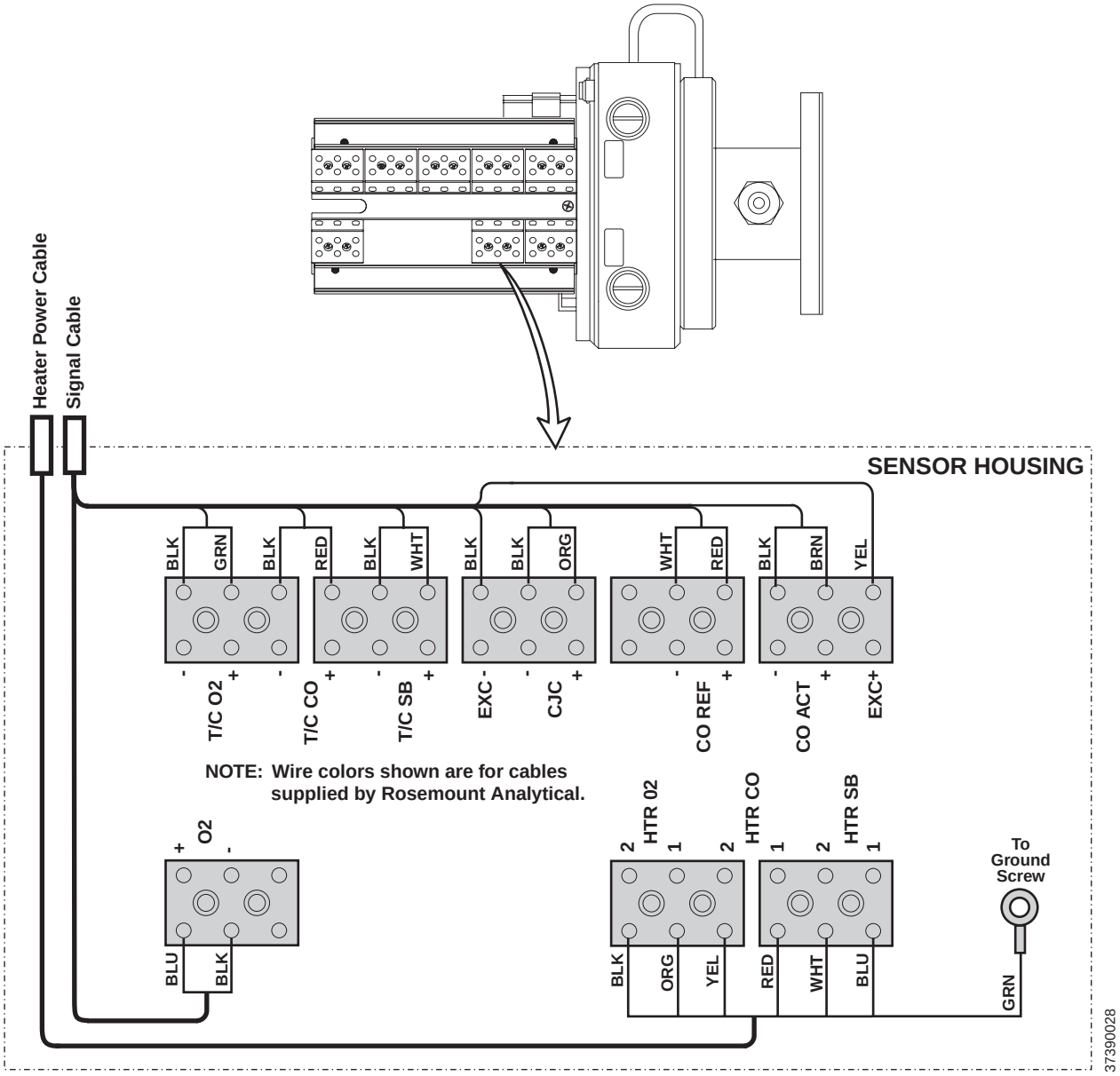
1. Turn off power to the system.
2. Shut off the test gasses at the cylinders and close the instrument air valve.
3. Disconnect the calibration gas, reference air, eductor air, and dilution air lines from the sensor housing, Figure 6-1.

Figure 6-1. OCX with Remote Electronics



4. Remove the cover from the sensor housing to expose the sensor housing terminal blocks, Figure 6-2.
5. Disconnect the signal cable from the O_2 and T/C terminal blocks, and from the CO and CJC terminal blocks.
6. Disconnect the heater power cable from the HTR terminal blocks.
7. If moving the sensor housing to another work site, disconnect and remove the power and signal cables from the sensor housing.
8. Remove insulation to access the mounting bolts. Unbolt the sensor housing from the stack and take it to a clean work area.
9. Allow the sensor housing to cool to a comfortable working temperature.

Figure 6-2. Sensor Housing Terminals



Install Sensor Housing

1. Connect the test gas, reference air, eductor air, and dilution air lines to the sensor housing.
2. Remove the sensor housing cover.
3. If removed, install the power and signal cables and the customer power and signal conduits and wiring at the sensor housing.
4. Connect the signal cable to O_2 and T/C terminal blocks and to the CO and CJC terminal blocks, Figure 6-2. Connect the heater power cable to the HTR terminal blocks.
5. Refer to Figure 6-1 and make sure all test gas lines and electrical connectors are complete.
6. Install the sensor housing cover.
7. Restore power to the system. Allow OCX to reach normal operating temperature before installing in a hot process stack.
8. Insert and bolt the sensor housing in the stack and install insulation.
9. Turn on the test gases at the cylinders and open the instrument air supply valve.

Remove Remote Electronics Housing

1. Turn off power to the system.
2. Shut off the test gases at the cylinders and close the instrument air supply valve, Figure 6-1.
3. Disconnect the test gas and instrument air lines from the remote electronics housing.
4. Remove the cover from the electronics housing to expose the electronics housing terminal blocks, Figure 6-3.
5. Disconnect and remove the power leads from the AC power input terminal block. Remove the ground lead from the ground stud.
6. Disconnect and remove the O_2 and COe signal leads from the 4-20 mA signal output terminal block.
7. If used, disconnect and remove the external relay leads from the alarm output relay terminal block.
8. Disconnect the signal cable leads from O_2 cell and thermocouple connector (J4), and from COe and CJC connector (J5), Figure 6-4.
9. Disconnect the heater cable leads from the heater power connector (J3).
10. If moving the electronics housing to another work site, disconnect and remove the power and signal cables and customer wiring conduits from the housing.
11. Remove the remote electronics housing from its mounting and move it to a suitable work area.

Figure 6-3. Electronics Housing
Terminal Blocks

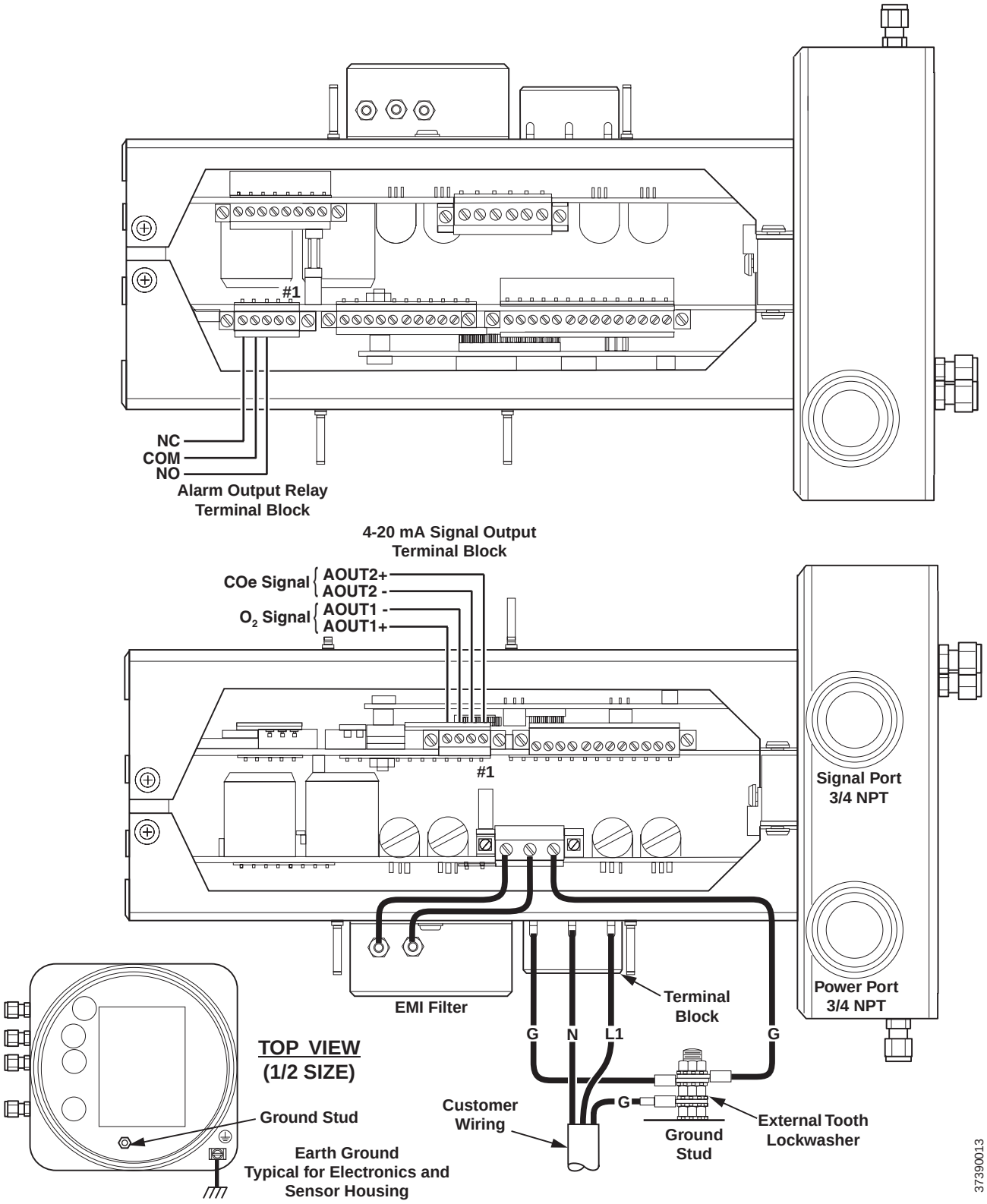
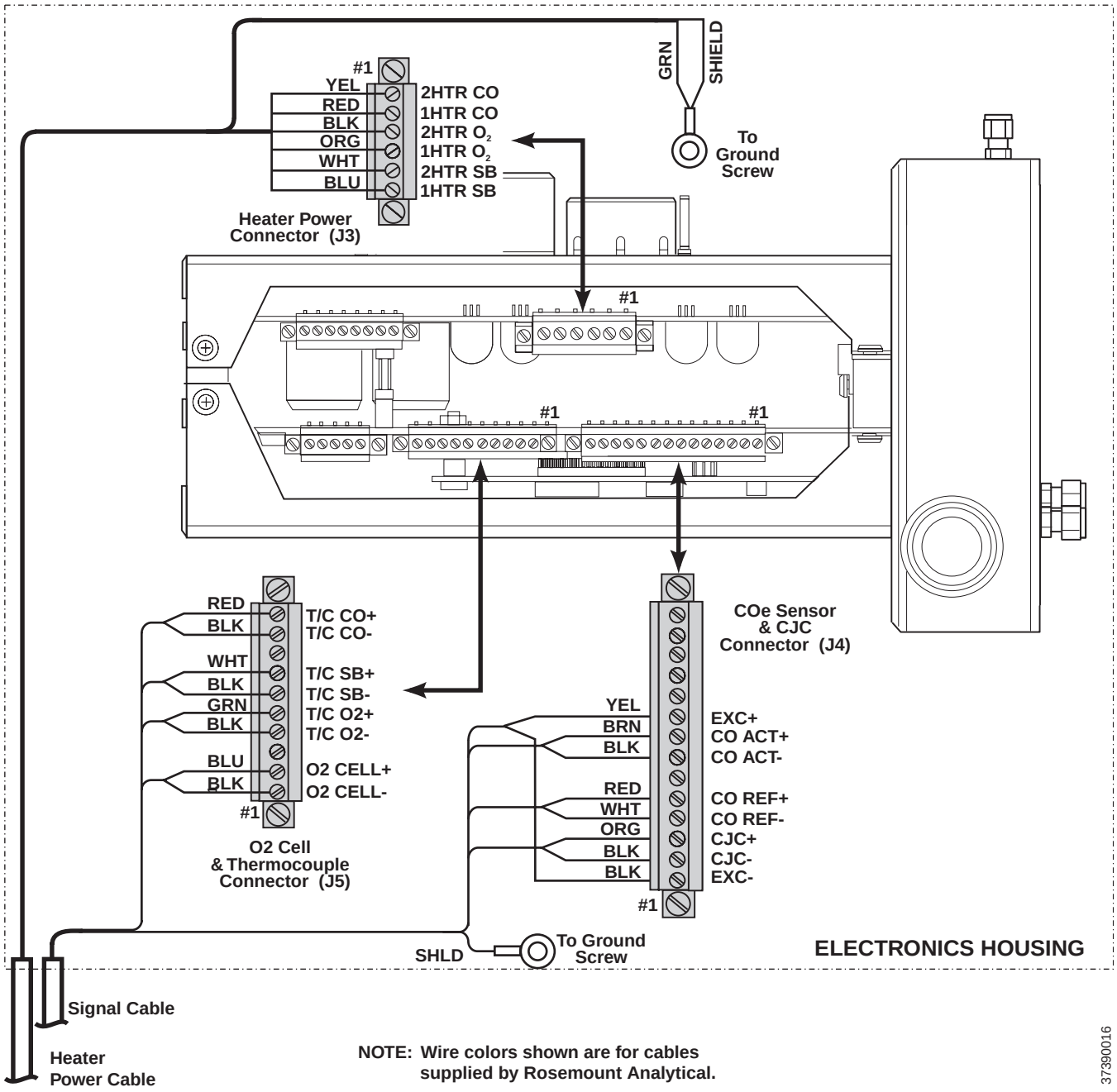


Figure 6-4. Remote Electronics Housing Cable Connections



Install Remote Electronics Housing

1. Mount remote electronics housing on wall or pipe within distance of signal and heater cables in use.
2. Remove the electronics housing cover.
3. If removed, install the power and signal cables and the customer power and signal conduits and wiring at the electronics housing.
4. Connect the signal cable leads to the O_2 cell and thermocouple connector (J4), and to the COe and CJC connector (J5), Figure 6-4.
5. Connect the heater cable leads to the heater power connector (J3).
6. Connect the line (L1 wire) to the L1 terminal, and the neutral (N wire) to the N terminal on the AC power input terminal block, Figure 6-4.
7. Connect the ground lead to the ground stud. Secure the connection with two nuts. Attach a separate ground lead (G wire) from the ground stud to the G terminal on the power input terminal block.
8. If used, connect external relay leads to the alarm output relay terminal.
9. Connect the test gas and instrument air lines to the remote electronics housing. Connect the calibration gas line and instrument air line to the remote electronics housing.
10. Refer to Figure 6-1 and Figure 6-4. Make sure all test gas lines and electrical connections are complete.
11. Install the cover on the electronics housing.
12. Turn on the test gasses at the cylinders and open the instrument air valve.
13. Restore power to the system.

REPAIR SENSOR HOUSING

Use the following procedures to remove damaged components from the OCX 8800 sensor housing and to install new replacement parts. Disassemble the unit only as needed to replace damaged components. Use the assembly procedures that apply to install replacement parts and reassemble the unit.

Sensor Housing Disassembly

Remove Cover and Terminals Insulator

1. Loosen screw (1, Figure 6-5) and slide locking clip (2) away from cover. Retighten screw (1).
2. With two hands or strap wrench, turn cover (3) counterclockwise to loosen. Unthread and remove cover.
3. Inspect cover o-ring (4) for wear or damage. Replace cover o-ring if damaged.
4. Unsnap terminal marking plates (5) and remove terminal insulator (6).

Figure 6-5. Removal of O_2 Cell and Heater Strut Assembly

1. Screw
2. Locking Clip
3. Cover
4. O-ring
5. Marking Plate
6. Terminal Insulator
7. Reference Air Tube
8. Sensor Housing
9. Heater Strut Assembly
10. Gasket
11. Screw
12. Heater Clamp
13. Heater Rod

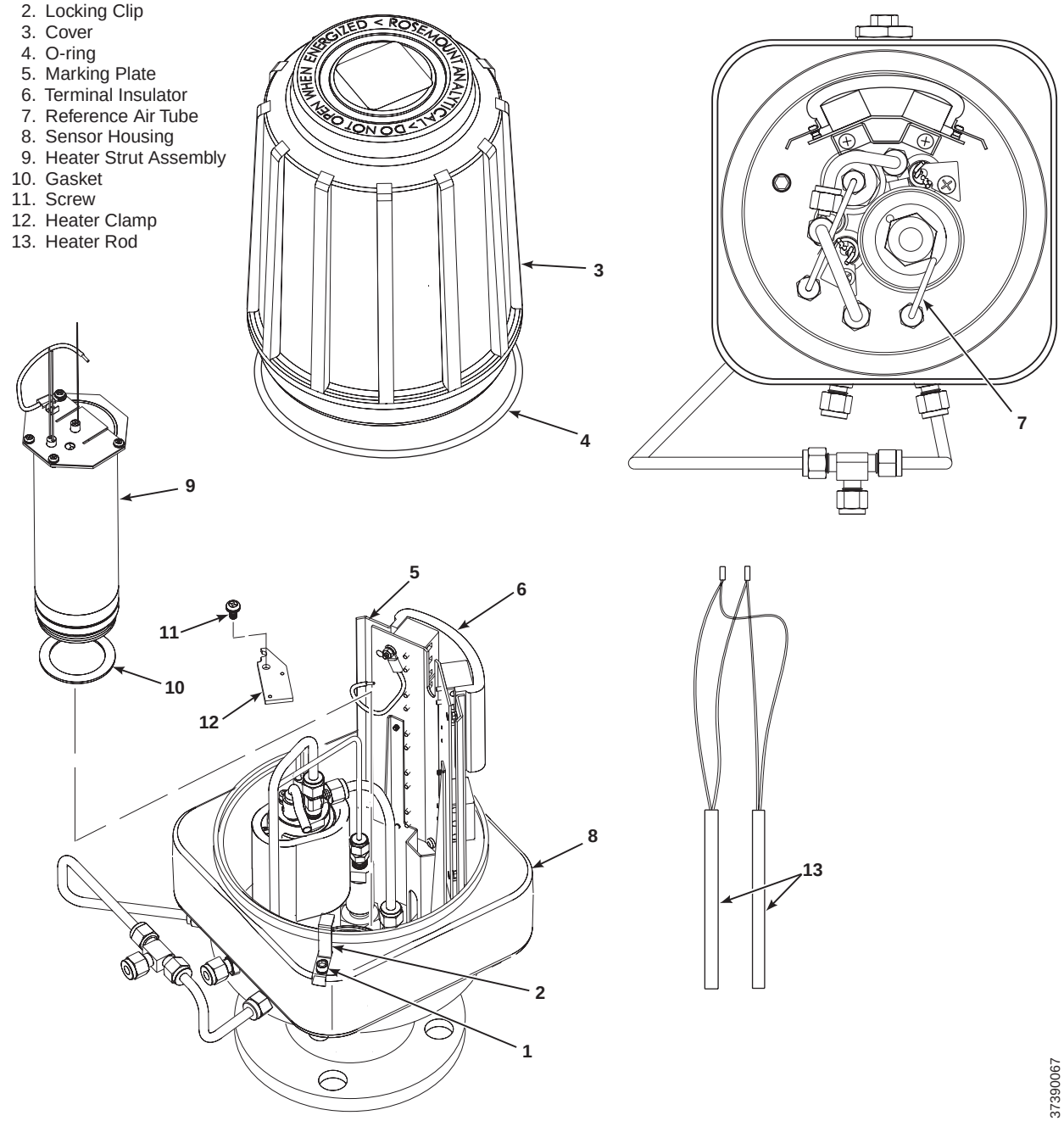
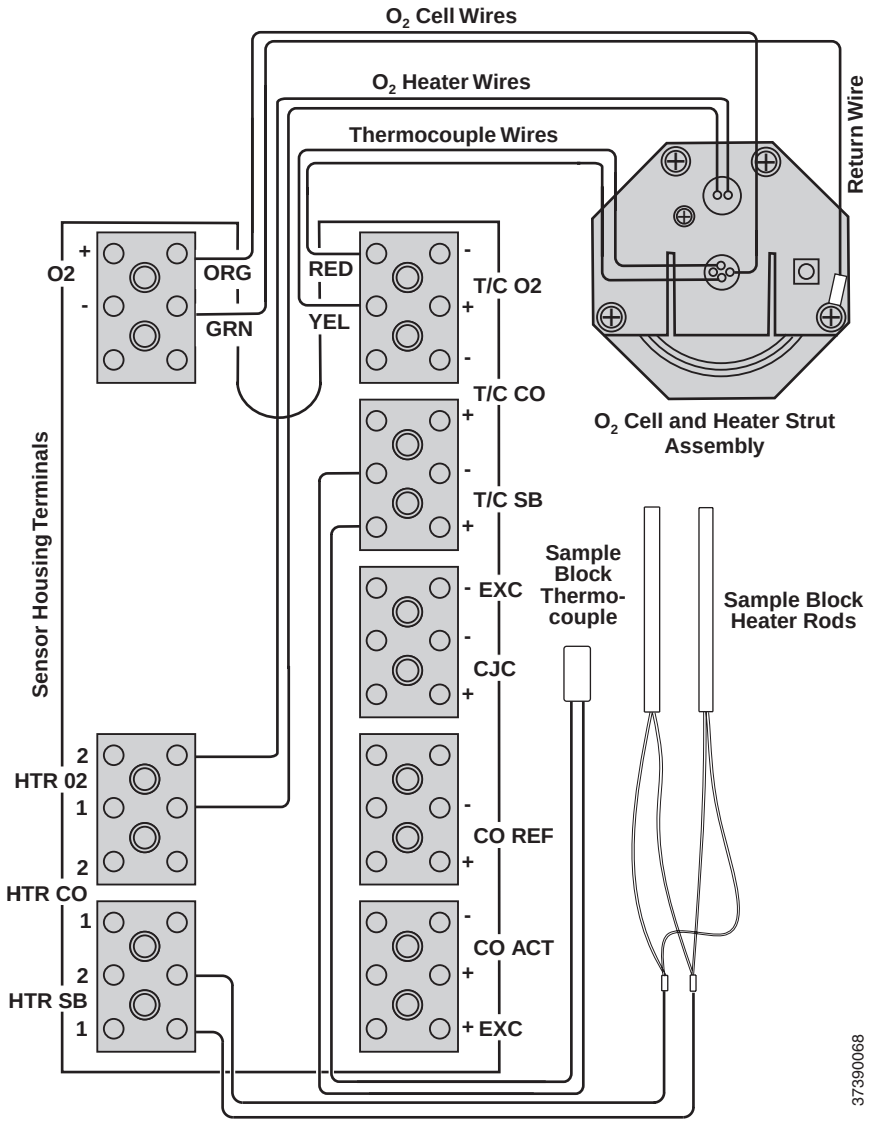


Figure 6-6. O_2 Cell, Thermocouple, and Heater Connections



Remove O_2 Cell and Heater Strut Assembly

1. Remove reference air tube (7, Figure 6-5) from sensor housing (8).
2. See Figure 6-6. Disconnect and tag O_2 heater wires, O_2 cell and return wires, and thermocouple wires at the sensor housing terminals.
3. Remove the O_2 cell and heater strut assembly (9, Figure 6-5) from sensor housing (8). Remove and discard gasket (10).

Remove Sample Block Heater Rods

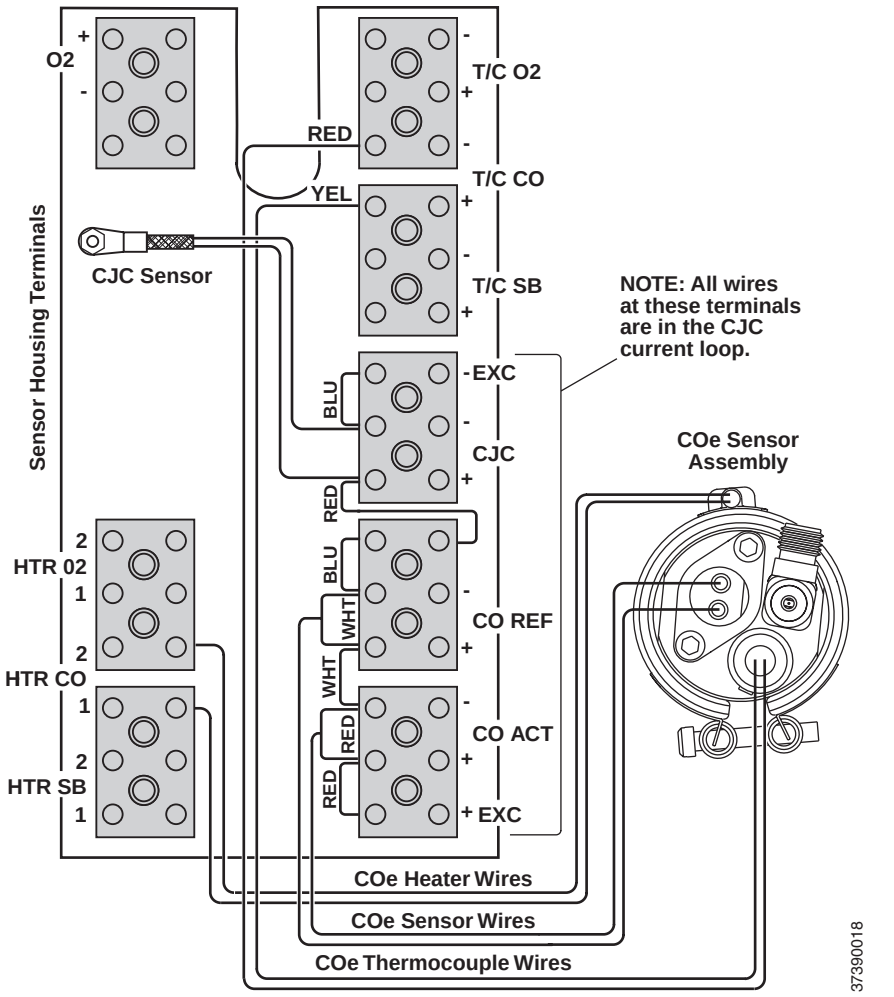
1. Disconnect sample block heater rod wires from terminal block. Refer to Figure 6-6.

2. Loosen screws (11, Figure 6-5) and rotate heater clamps (12) to release heater rods (13). One heater clamp secures each heater rod.
3. Slide sample block heater rods (13) out of housing (8).

Remove COe Sensor Assembly

1. Disconnect COe heater, thermocouple, and sensor wires from terminal blocks. Refer to Figure 6-7.
2. Remove insulator (1, Figure 6-8).

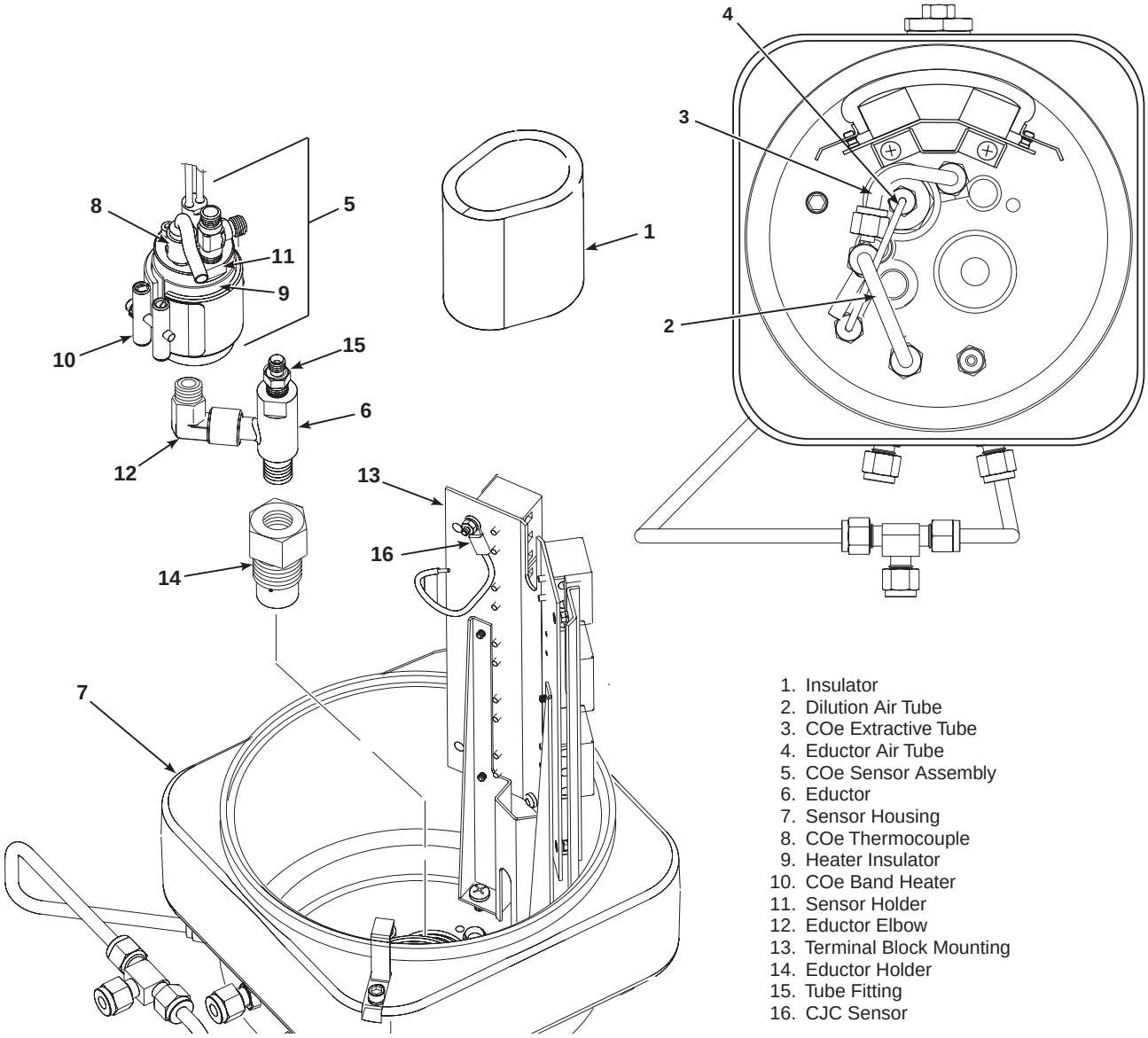
Figure 6-7. COe Sensor, Thermocouple, and Heater Connections



NOTE
For easier access, you may remove two screws from base of terminal block mounting (13) and move terminal block assembly out of the way.

3. Remove tubes (2, 3, and 4) from COe sensor assembly (5), eductor fittings (12 and 15), and sensor housing (7).
4. Unfasten bayonet connector of COe thermocouple (8) and remove thermocouple.
5. Loosen clamp screw of COe band heater (9) until heater rotaters freely on sensor holder (11).

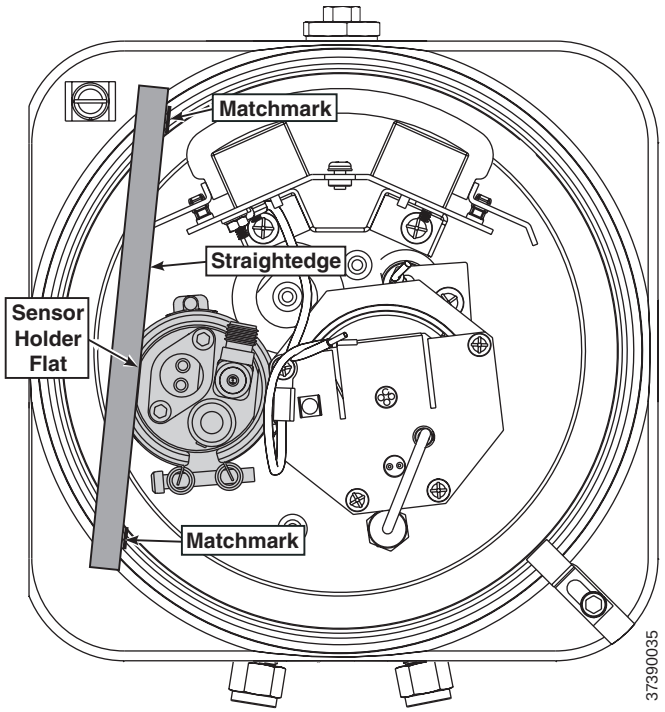
Figure 6-8. Removal of COe Sensor Assembly



1. Insulator
2. Dilution Air Tube
3. COe Extractive Tube
4. Eductor Air Tube
5. COe Sensor Assembly
6. Eductor
7. Sensor Housing
8. COe Thermocouple
9. Heater Insulator
10. COe Band Heater
11. Sensor Holder
12. Eductor Elbow
13. Terminal Block Mounting
14. Eductor Holder
15. Tube Fitting
16. CJC Sensor

6. See Figure 6-9. Using straightedge on the sensor holder flat, as shown, matchmark upper flange of sensor housing to show correct alignment of sensor holder.
7. With one wrench holding eductor elbow (12, Figure 6-8), and one wrench on flats of sensor holder (11), unthread and remove COe sensor assembly (5). Do not allow eductor elbow to turn.
8. Slide band heater (10) and heater insulator (9) from sensor holder (11).

Figure 6-9. Alignment of COe Sensor Assembly

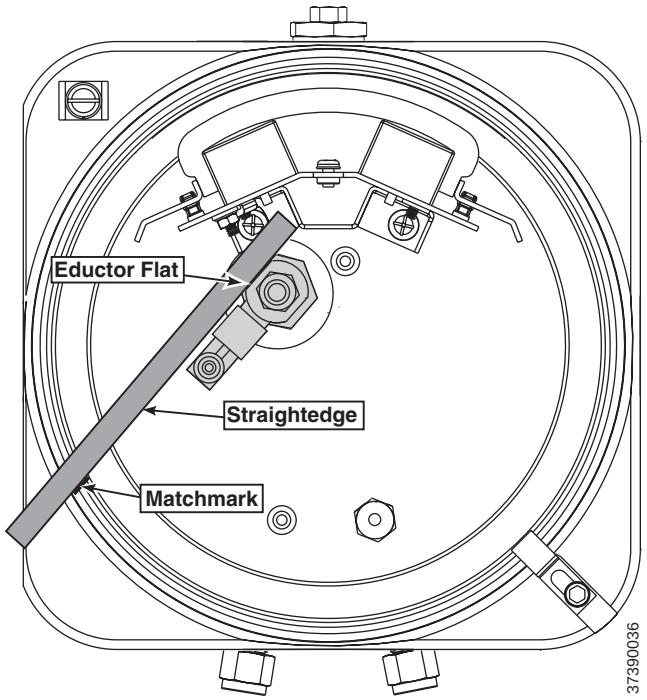


Remove Eductor

The O_2 cell and heater strut assembly (9, Figure 6-5) and the COe sensor assembly (5, Figure 6-8) must be removed before you start this procedure.

1. Use straightedge to matchmark alignment of eductor flat and elbow, as shown in Figure 6-10.

Figure 6-10. Eductor Alignment Matchmarks



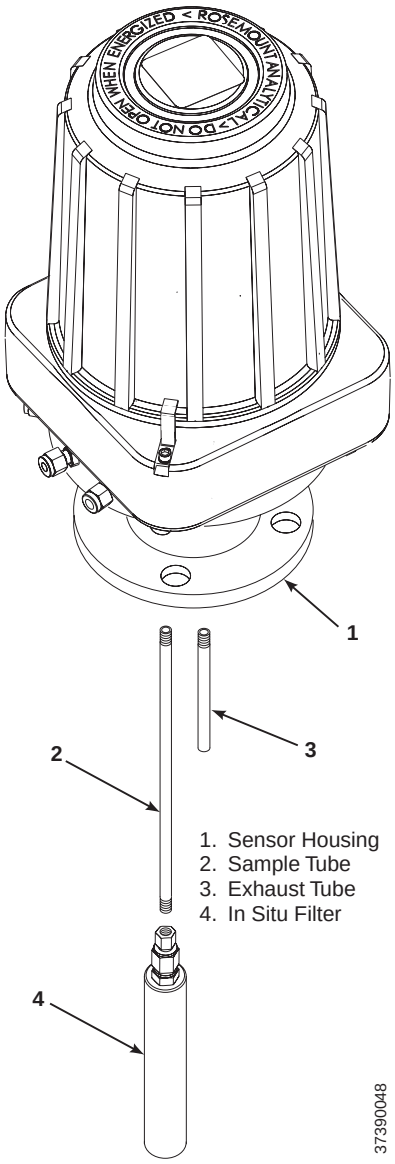
2. Unscrew terminal block mounting (13, Figure 6-8). Move terminal block mounting away from eductor (6).
3. Unscrew eductor holder (14) with eductor (6) and fittings (12 and 15) from sensor housing (7).
4. Clamp flats of eductor (6) in jaws of bench vise.

⚠WARNING

Use heat resistant gloves when removing mating parts from the eductor. The mating parts are bonded with a thread sealing compound. The compound softens at 450°F (232°C). The heated parts can cause severe burns.

5. Use a propane torch to heat the eductor (6) to 450°F (232°C), minimum. Apply the heat near the screw threads.
6. While heating the eductor (6), use wrench to apply removal torque to elbow (12), eductor holder (14), or tube fitting (15) until the thread sealant softens. Remove mating parts (12, 14, and 15).
7. Use MEK or methylene chloride solvent to clean thread sealant residue from the pipe threads of the mating parts. Refer to applicable MSDS sheet for solvent handling precautions.

Figure 6-11. Removal of Sample and Exhaust Tubes



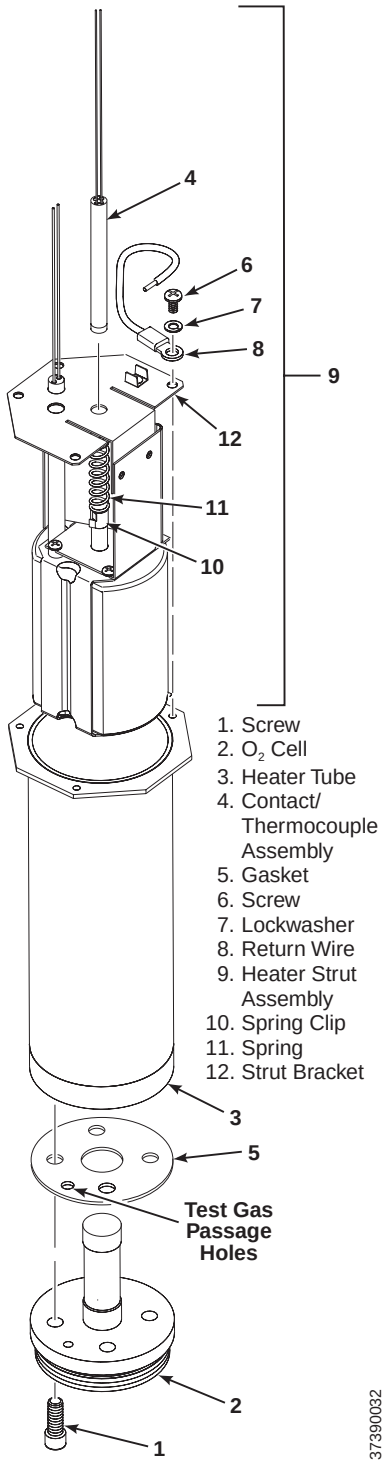
Remove Sample and Exhaust Tubes

⚠WARNING

Use heat resistant gloves when removing the probe tube or exhaust tube. The tubes are bonded with a thread sealing compound. The compound softens at 450°F (232°C). The heated parts can cause severe burns.

1. Secure the sensor housing (1, Figure 6-11) in soft (plastic, wood, or brass) vice jaws.
2. Use a propane torch to heat the sample tube (2) or exhaust tube (3) to 450°F (232°C), minimum. Apply the heat near the threaded end of the tube.
3. While heating the tube, use a pipe wrench to apply removal torque to part being removed. Apply torque until the pipe thread sealant softens. Remove and discard the used sample tube (2), exhaust tube (3), or in-situ filter (4).
4. Use MEK or methylene chloride solvent to clean thread sealant residue from the internal pipe threads in the housing. Refer to applicable MSDS sheet for solvent handling precautions.

Figure 6-12. O_2 Cell, Heater, and Thermocouple, Exploded View



1. Screw
2. O_2 Cell
3. Heater Tube
4. Contact/ Thermocouple Assembly
5. Gasket
6. Screw
7. Lockwasher
8. Return Wire
9. Heater Strut Assembly
10. Spring Clip
11. Spring
12. Strut Bracket

⚠CAUTION

Do not remove the O_2 cell unless you are certain it needs to be replaced. Removal may damage the cell and platinum pad. Remove the O_2 cell for cell replacement only.

Disassemble O_2 Cell and Heater Strut Assembly

Do not attempt to replace the O_2 cell until all other possibilities for poor performance have been considered. If cell replacement is needed, order the O_2 cell replacement kit (Refer to Section 8, Replacement Parts).

The O_2 cell replacement kit contains an O_2 cell and flange assembly, gaskets, socket head cap screws, and anti-seize compound. The items are carefully packaged to preserve precise surface finishes.

Do not remove items from the package until they are ready to be used.

1. Remove the four allen cap screws (1, Figure 6-12) from the O_2 cell (2). Remove the O_2 cell. The cell flange has a notch that may be used to gently pry the flange away from heater tube (3).

NOTE
The pad on the end of contact/thermocouple assembly (4) will sometimes fuse to the O_2 cell (2).

2. If the O_2 cell is fused to the contact pad, push the O_2 cell back into the heater tube (against spring pressure) and quickly twist the O_2 cell. The cell and contact pad should separate. If the contact pad stays fused to the cell, a new contact/thermocouple assembly (4) must be installed.
3. Remove and discard gasket (5). Clean the mating surface of heater tube (3). Remove burrs and raised surfaces with a block of wood and crocus cloth.

⚠CAUTION

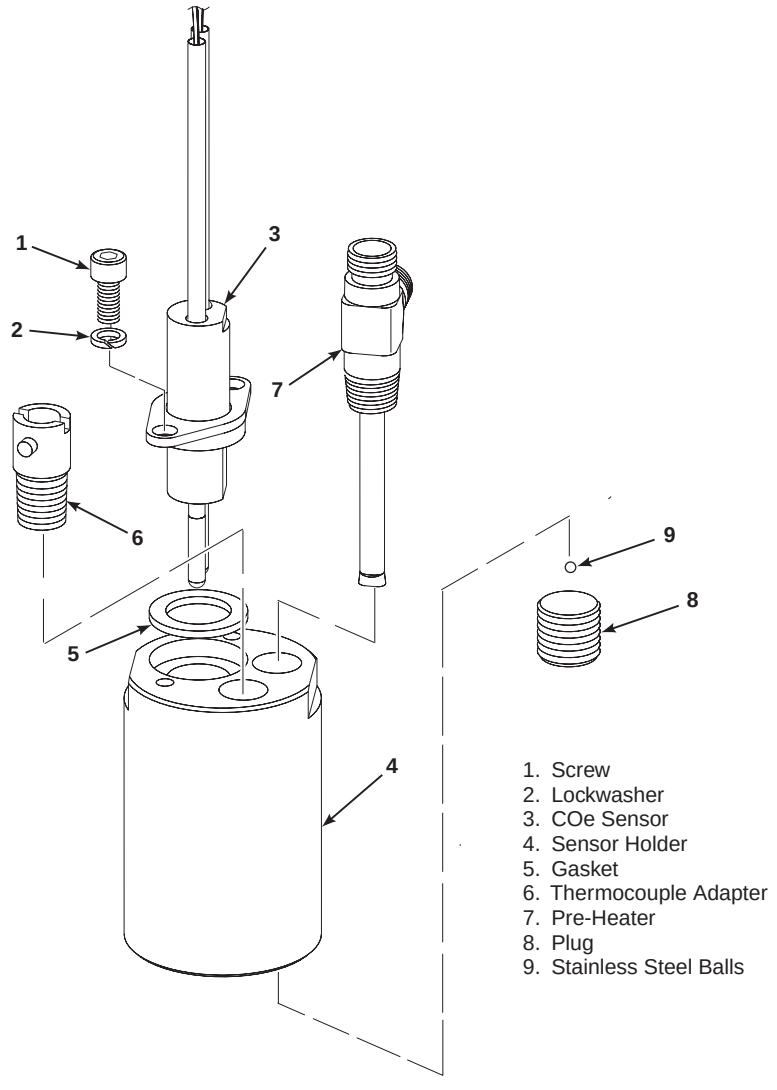
Use care when handling contact and thermocouple assembly. The ceramic rod in this assembly is fragile.

4. Remove screws (6), lockwashers (7), return wire (8), and heater strut assembly (9).
5. If replacing contact and thermocouple assembly (4), use a pencil to mark location of spring clip (10) before removing. Squeeze tabs on spring clip to remove. Retain spring clip and spring (11); replace if damaged.
6. While carefully handling new contact and thermocouple assembly (4) lay old assembly next to new one. Transfer match marks to new assembly.
7. Carefully guide new contact and thermocouple assembly (4) through strut bracket (12), spring (11), and spring clip (10) until spring clip reaches pencil mark.

Disassemble COe Sensor Assembly

1. Carefully remove screws (1, Figure 6-13), lockwashers (2), and COe sensor (3) from sensor holder (4). Remove and discard gasket (5).
2. If damaged, use the following procedure to remove thermocouple adaptor (6) from sensor holder (4):
   a. Use a propane torch to heat the thermocouple adaptor to 450°F (232°C), minimum.
   b. While heating, use a flat-head screwdriver to apply removal torque. Apply torque until the pipe thread sealant softens. Remove and discard the thermocouple adaptor.
   c. Use MEK or methylene chloride solvent to clean thread sealant residue from the internal pipe threads in the sensor holder. Refer to applicable MSDS sheet for solvent handling precautions.

Figure 6-13. COe Sensor, Exploded View



⚠CAUTION

Always remove the stainless steel balls (approximately 200) from sensor holder before removing or installing pre-heater. Turning pre-heater in the sensor holder with the stainless steel balls in place will cause permanent damage to the pre-heater.

3. If pre-heater (7) is to be removed, clamp flats of sensor holder (4) in vise jaws with plug (8) pointing up. Remove plug. Unclamp sensor holder and pour stainless steel balls (9) into a container.

NOTE
Pre-heater should only be removed when pre-heater or sensor holder is damaged. If removal is not required, leave the pre-heater installed in the sensor holder.

4. Unthread and remove pre-heater (7).
5. Use a cleaning solvent to thoroughly clean stainless steel balls (9) and pre-heater chamber in sensor housing (4). Refer to applicable MSDS sheet for solvent handling precautions.

Sensor Housing Assembly

Assemble COe Sensor Assembly

⚠CAUTION

Always remove the stainless steel balls (approximately 200) from sensor holder before removing or installing pre-heater. Turning pre-heater in the sensor holder with the stainless steel balls in place will cause permanent damage to the pre-heater.

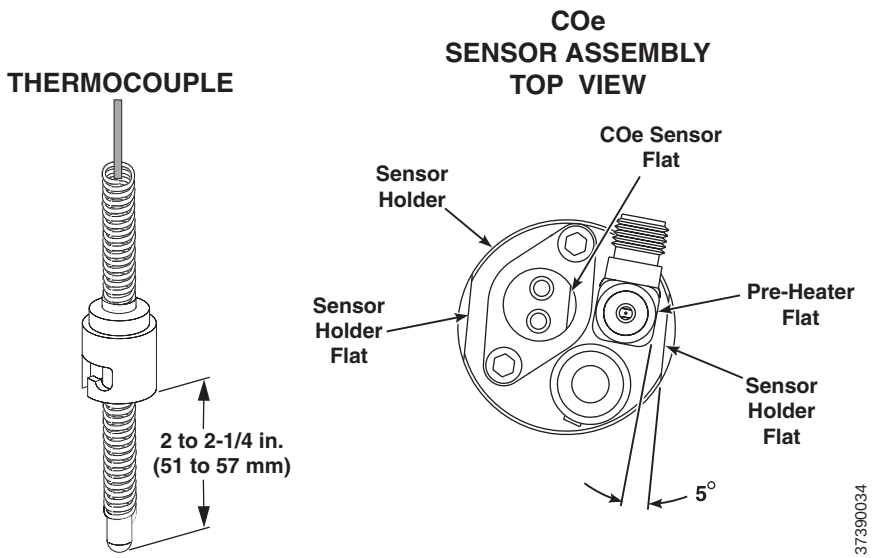
1. If pre-heater (7, Figure 6-13) was removed, apply pipe thread sealant (Loctite #567) to the external pipe threads of pre-heater (7) and plug (8). Do not apply sealant to the first turn of the pipe threads.
2. Clamp flats of sensor holder (4) in vise jaws with pre-heater port pointing up.
3. Install and tighten pre-heater (7). Align pre-heater to flat of sensor holder (4) as shown in Figure 6-14.
4. Invert sensor holder (4, Figure 6-13) in vise and pour stainless steel balls (9) into plug port. Press down on stainless steel balls and tap sensor holder with plastic hammer to compact balls in pre-heater chamber.
5. Install and tighten plug (8).

⚠CAUTION

Use care when installing the combustibles (COe) sensor. The RTD elements are fragile and correct alignment in sensor holder is required for proper OCX operation.

6. Lubricate and install COe sensor gasket (5). Apply anti-seize compound to threads of screws (1).

Figure 6-14. COe Sensor and Pre-Heater Alignment



7. Install COe sensor (3), lockwashers (2), and screws (1). Rotate flat of COe sensor (3) to center of sensor holder (4).
8. Align COe sensor flat parallel to sensor holder flat, as shown in Figure 6-14. Tighten screws (1, Figure 6-13).
9. If replacing thermocouple adaptor (6), apply anti-seize to the pipe threads. Install and tighten thermocouple adaptor.

Assemble O_2 Sensor and Heater Strut Assembly

1. See Figure 6-12. Assemble O_2 cell (2), gasket (5), and heater tube (3). Make sure the test gas passage holes line up with each other in all components.
2. Apply a small amount of anti-seize compound to the screw threads and use screws (1) to secure assembly. Torque to 35 in-lbs (4 N·m).
3. Carefully slide O_2 heater strut assembly (9) into heater tube (3).
4. Press down on the back plate of strut bracket (12) to ensure spring (11) tension is present to hold contact pad against O_2 cell (2).
5. Secure strut bracket (12) and return wire (8) with four screws (6) and lockwashers (7). Make sure return wire (8) is tightly fastened. This is the ground side connection for the O_2 cell.

Install Sample and Exhaust Tubes

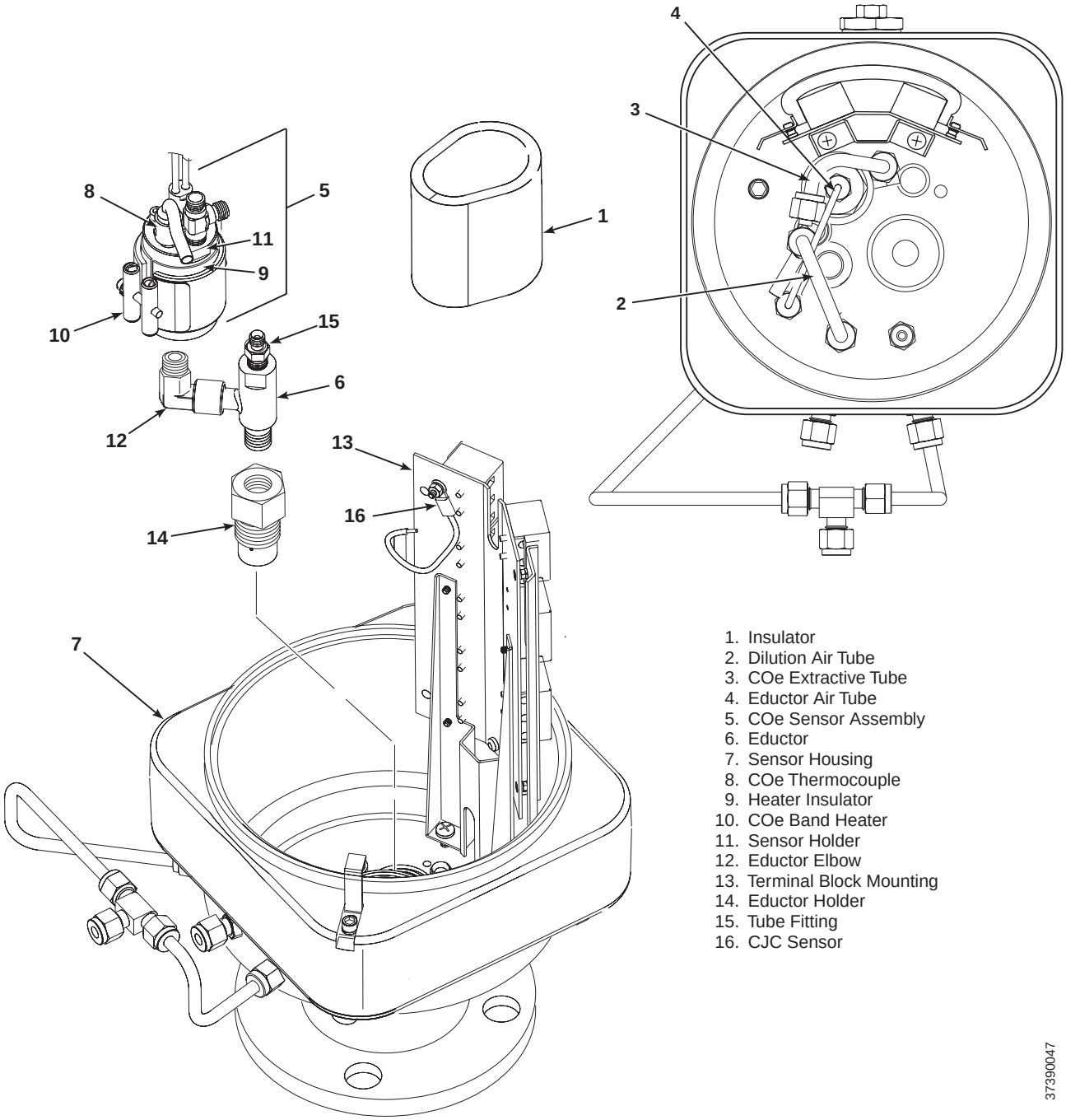
1. See Figure 6-11. Apply pipe thread sealant (Loctite #567) to the replacement sample tube (2) or exhaust tube (3) pipe threads. Do not apply sealant to the first turn of the pipe threads.
2. Thread the sample tube (2) or exhaust tube (3) into the housing (1). Use a pipe wrench to tighten the tube.
3. If used, install and tighten in-situ filter (4).

Install Eductor

If installed, the O_2 cell and heater strut assembly (9, Figure 6-5) must be removed from sensor housing (8), before you install the eductor.

1. Apply pipe thread sealant (Loctite #567) to the external pipe threads of eductor (6, Figure 6-15). Do not apply sealant to the first turn of the pipe threads.

Figure 6-15. Installation of Eductor and COe Sensor



1. Insulator
2. Dilution Air Tube
3. COe Extractive Tube
4. Eductor Air Tube
5. COe Sensor Assembly
6. Eductor
7. Sensor Housing
8. COe Thermocouple
9. Heater Insulator
10. COe Band Heater
11. Sensor Holder
12. Eductor Elbow
13. Terminal Block Mounting
14. Eductor Holder
15. Tube Fitting
16. CJC Sensor

2. Install and tighten eductor (6) in eductor holder (14).
3. Install and tighten elbow (12) on eductor (6). Male port of elbow must point up and be in line with long axis of eductor.
4. Apply anti-seize compound to the external pipe threads of eductor holder (14).
5. Install and tighten eductor holder (14) in sensor housing (7). Align eductor with matchmarks, as shown in Figure 6-16.

Figure 6-16. COe Sensor Parts Alignment

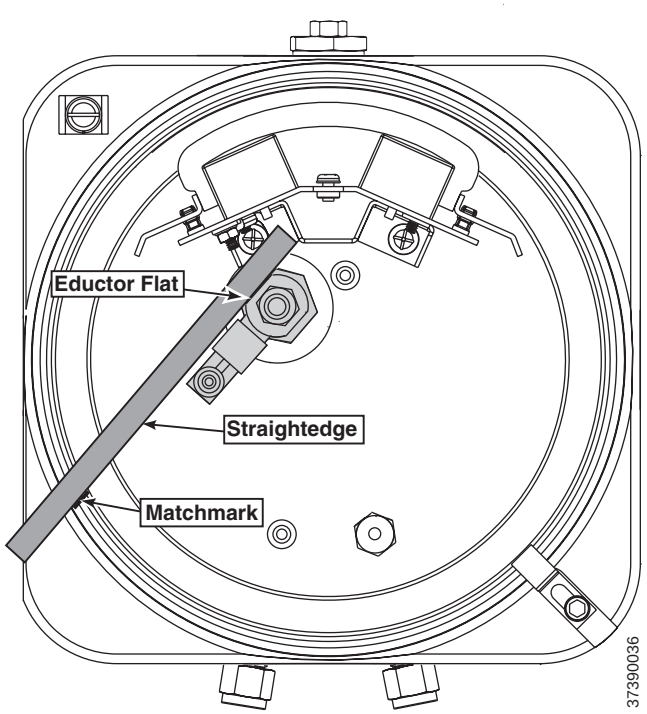
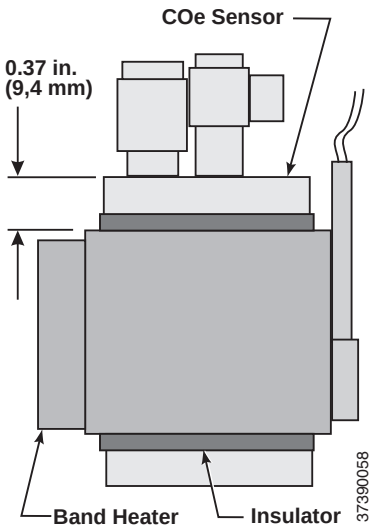


Figure 6-17. Band Heater Height



Install COe Sensor Assembly

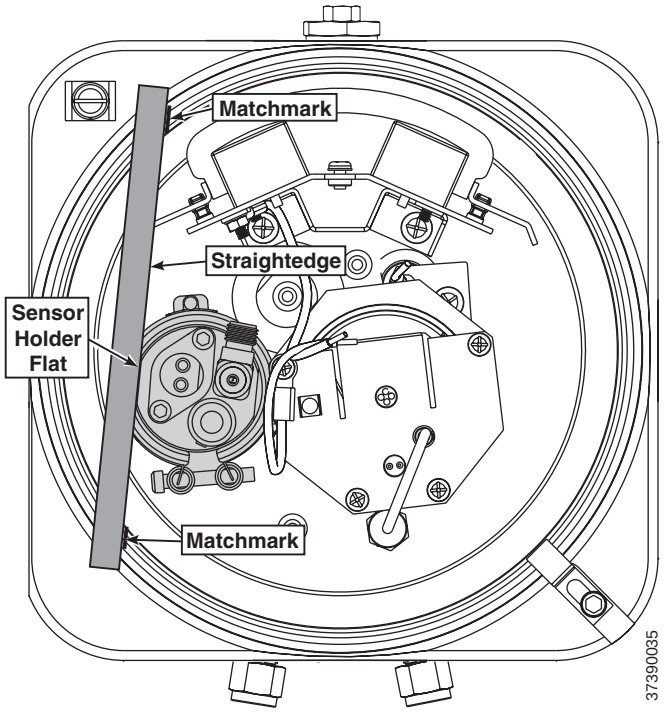
1. Apply pipe thread sealant (Loctite #567) to the exposed pipe threads of eductor elbow (12, Figure 6-15). Do not apply sealant to the first turn of the pipe threads.
2. Screw sensor holder (11) onto eductor elbow (12).
3. With wrenches on eductor elbow (12) and on flats of sensor holder (11), tighten sensor holder. Do not allow eductor elbow to turn.
4. Tighten sensor holder (11) to align outside flat with matchmark on sensor housing flange, as shown in Figure 6-18.

⚠CAUTION

The heater insulator prevents current leakage between the band heater and the sensor holder. Failure to properly install the insulator may cause the device to trip a ground fault interrupt circuit.

5. Wrap heater insulator (9) around sensor holder (11). Make sure the insulator joint lines up with the band gap of the COe band heater (10).
6. Slide COe band heater (10, Figure 6-15) up onto sensor holder (11). Do not tighten the band heater at this time. Heater must rotate freely around sensor holder.
7. Check for proper height of COe heater thermocouple (Figure 6-14). Thread bayonet connector up or down to adjust height.
8. Install and fasten thermocouple (8, Figure 6-15).
9. Position band heater as shown in Figure 6-17 and Figure 6-18 and tighten band heater clamp screw. The heater insulator (9) end joint must line up with the band gap of the COe band heater (10).

Figure 6-18. COe Sensor Holder Alignment



10. Reconnect the COe sensor, thermocouple, and heater wires at the sensor housing terminal blocks. Refer to Figure 6-19.
11. Install and fasten the COe insulator (1, Figure 6-15) around COe sensor assembly (5). All wiring must remain outside of the insulator.
12. If terminal block mounting (13, Figure 6-15) was moved, reinstall with two base mounting screws.

Figure 6-19. COe Sensor, Thermocouple, and Heater Connections

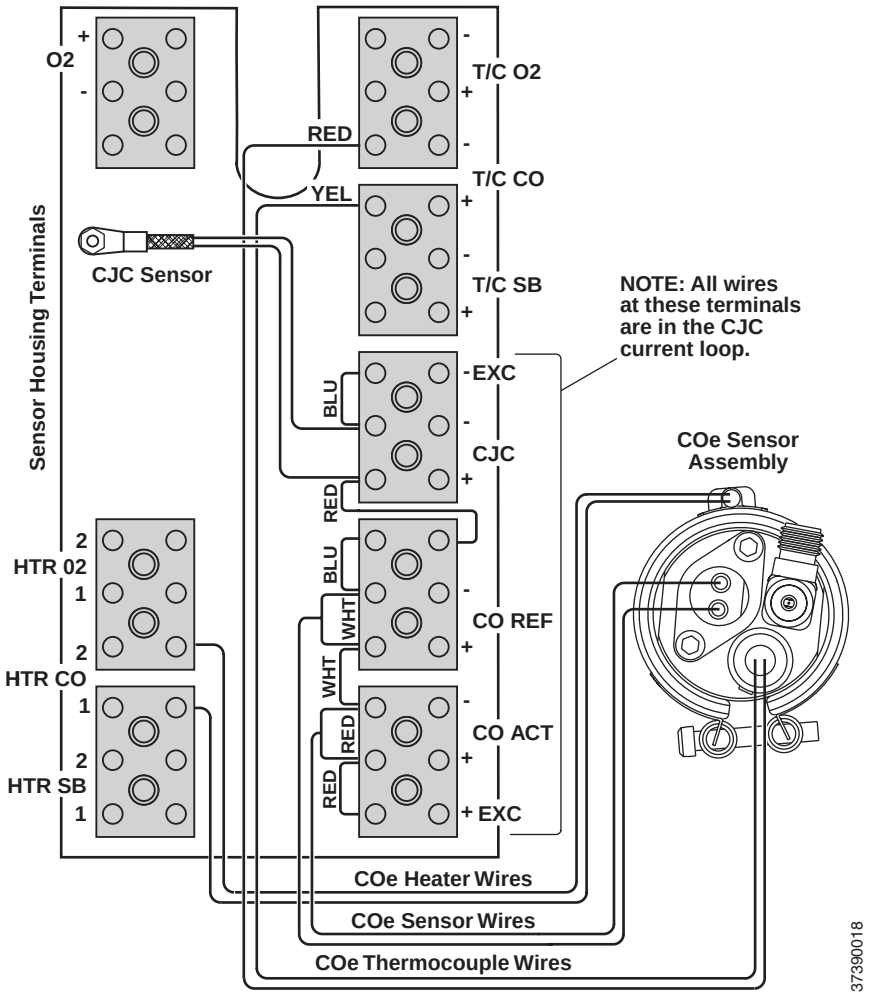
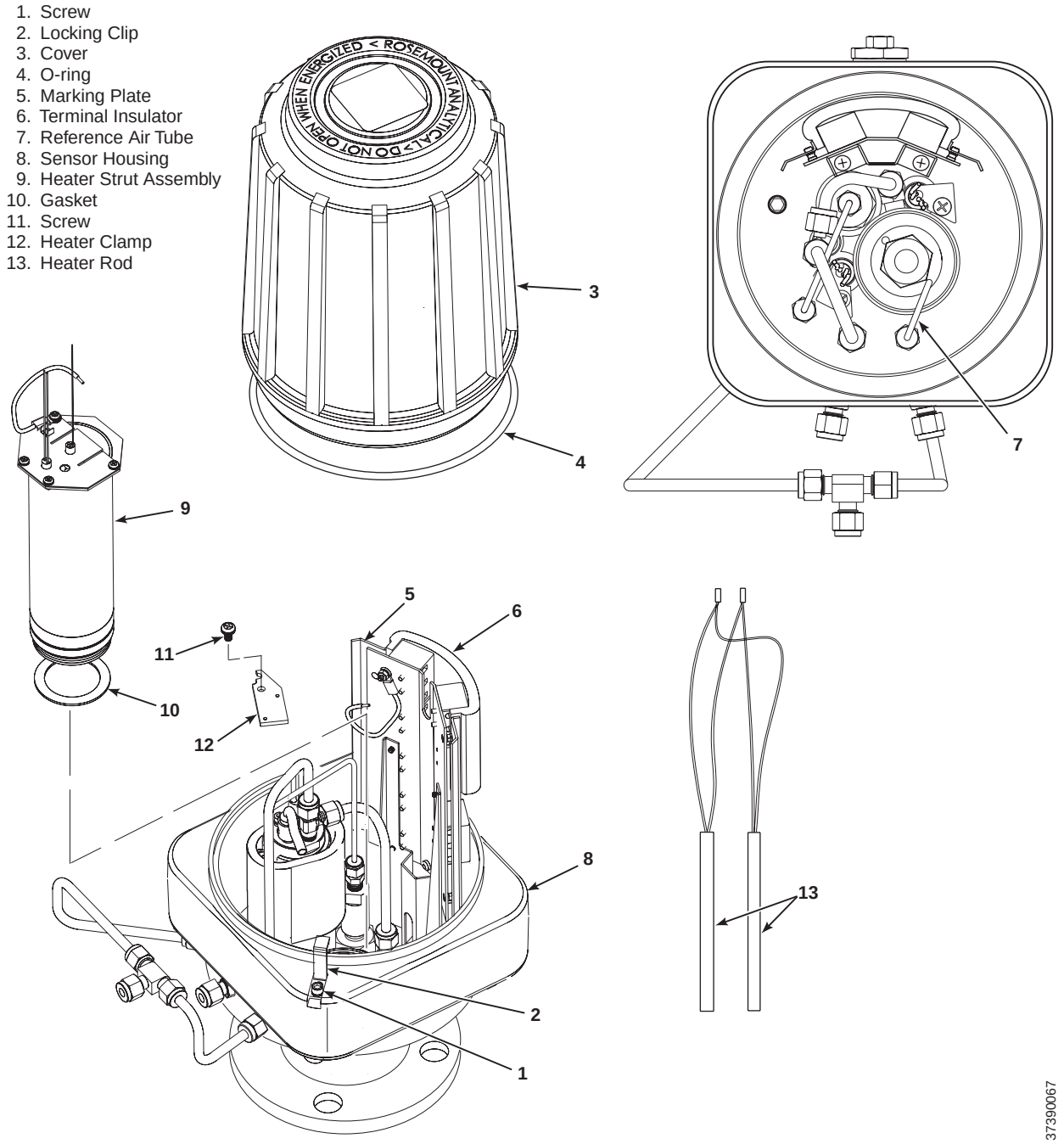


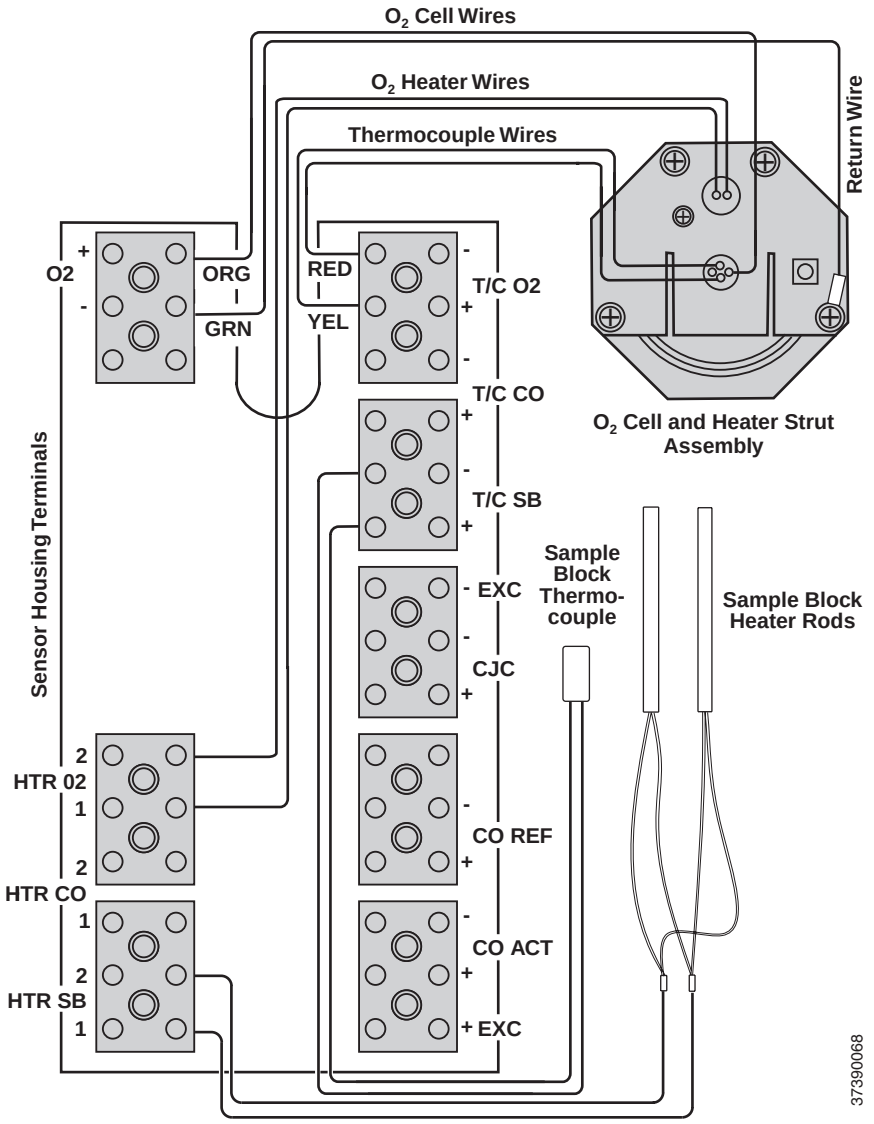
Figure 6-20. Installation of O_2 Cell and Heater Strut Assembly



Install Sample Block Heater Rods

1. Before installing sample block heater rods (13, Figure 6-20), evenly coat the heater rods with Watlube heater release agent.

Figure 6-21. O_2 Cell, Thermocouple, and Heater Connections



2. Install the heater rods (13), heater clamps (12), and screws (11).
3. Reconnect the heater rod leads at the sensor housing terminal blocks, (Figure 6-21).

Install O_2 Cell and Heater Strut Assembly

1. Rub a small amount of anti-seize compound on both sides of new gasket (10, Figure 6-20).
2. Apply anti-seize compound to threads of O_2 cell and heater strut assembly (9) and sensor housing (8).

⚠CAUTION

Stripped threads on the O_2 cell and heater strut assembly can allow gas leakage. Gas leakage can affect the O_2 measurements and calibration. Avoid over-tightening the O_2 cell and heater strut assembly .

3. Install O_2 cell and heater strut assembly (9) in sensor housing (8). Snug up, but do not over-tighten the assembly.
4. Reconnect the lead wires from O_2 cell, heater, and thermocouple to the sensor housing terminal blocks. Refer to Figure 6-21.
5. Install reference air tube (7, Figure 6-20) in sensor housing (8). Make sure that the open end of reference air tube extends into heater tube of O_2 cell and heater strut assembly (9).

Install Terminals Insulator and Cover

1. Install insulator (6, Figure 6-20) over uppermost terminal blocks. Position one side of insulator against terminal blocks and snap terminal marking plate (5) to mating stand-off.
2. Position opposite side of insulator (6) and secure with related marking plate (5).
3. If removed, install cover gasket (4). Screw cover (3) onto sensor housing (8). Tighten cover firmly.
4. Align locking clip (2) with gap between cover ribs.
5. Loosen screw (1) and slide locking clip (2) fully into gap between cover ribs. Retighten screw (1).

Sensor Housing Leak Test

1. Install 1/4 NPT cap on dilution air inlet fitting. Install a 1/4 NPT cap on sample tube (2, Figure 6-11) or plug 1/4 NPT sample inlet port. Capped or plugged ports must be air tight.
2. If not in place, install exhaust tube (3, Figure 6-11) in exhaust port according to the instructions provided.
3. Connect a calibrated manometer to the CAL GAS inlet port.
4. Connect and apply clean instrument air at 35 psig (241 kPa gage) to the instrument air inlet fitting.
5. Observe the manometer reading. The reading should be from 10 to 13 inches, Water Column. Locate and correct leaks if the reading is less than 10 inches WC.

REPAIR ELECTRONICS HOUSING

Use the following procedures to remove damaged components from the OCX 8800 electronics housing and to install new replacement parts. Disassemble the unit only as needed to replace damaged components. Use the assembly procedures that apply to install replacement parts and reassemble the unit.

Electronics Housing Disassembly

Remove Cover

1. See Figure 6-22. Loosen screw (1) and slide locking clip (2) away from cover (3). Retighten screw (1).
2. With two hands or strap wrench, turn cover (3) counterclockwise to loosen. Unthread and remove cover.
3. Inspect cover gasket (4) for wear or damage. Replace cover gasket if damaged.

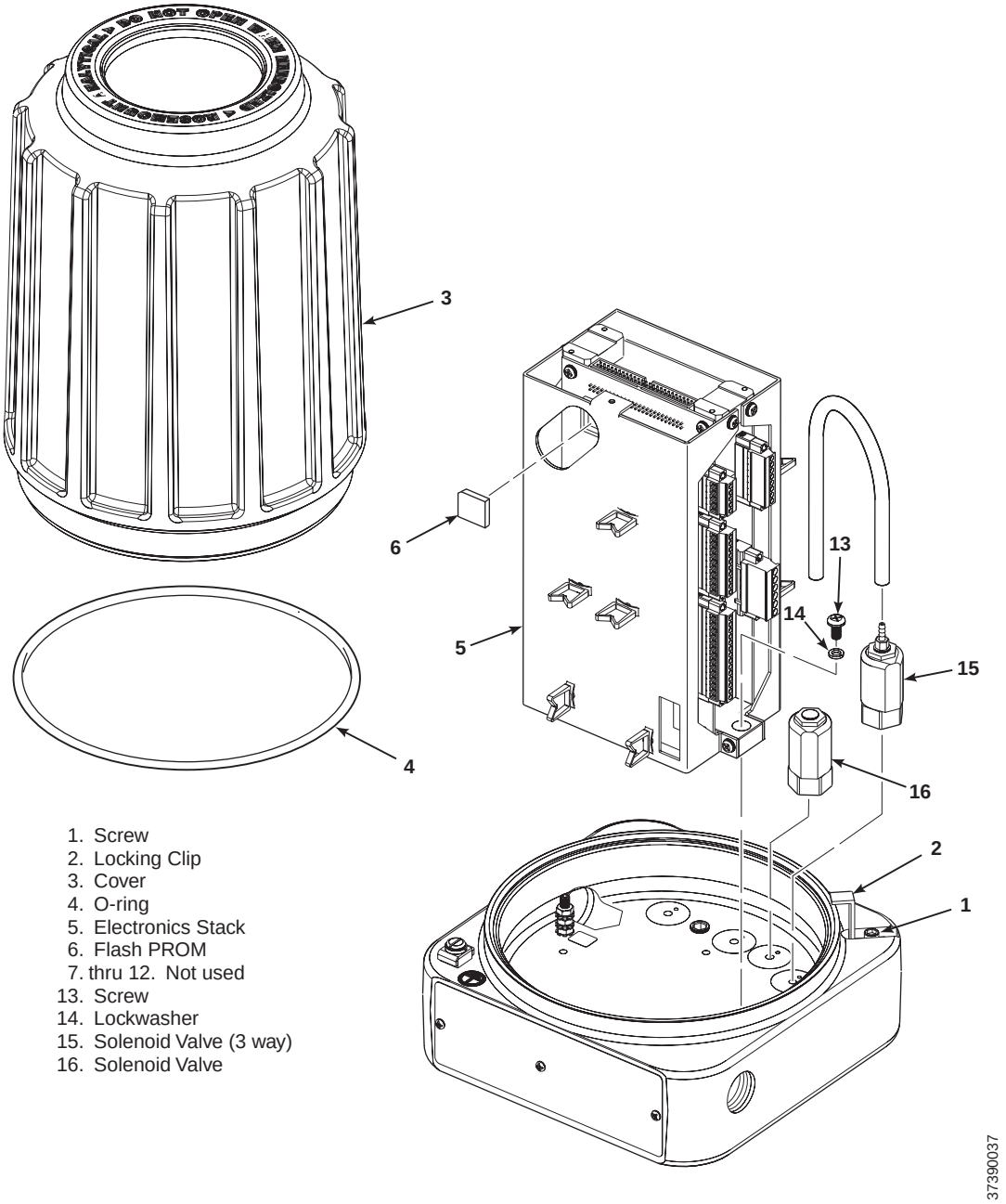
Remove Flash PROM

⚠CAUTION

Electrostatic discharge (ESD) protection is required to avoid damage to the electronic circuits.

1. Locate Flash PROM access port in electronics stack (5, Figure 6-22).
2. Use suitable IC removal tool to remove Flash PROM (6).

Figure 6-22. Removal/Installation of Electronics Housing Components



1. Screw
2. Locking Clip
3. Cover
4. O-ring
5. Electronics Stack
6. Flash PROM
7. thru 12. Not used
13. Screw
14. Lockwasher
15. Solenoid Valve (3 way)
16. Solenoid Valve

Remove Electronics Stack

1. Unplug power cable, signal cable, and solenoid lead connectors from terminals of electronics stack (5, Figure 6-22).
2. Remove two screws (13) and lockwashers (14).
3. Remove electronics stack (5).

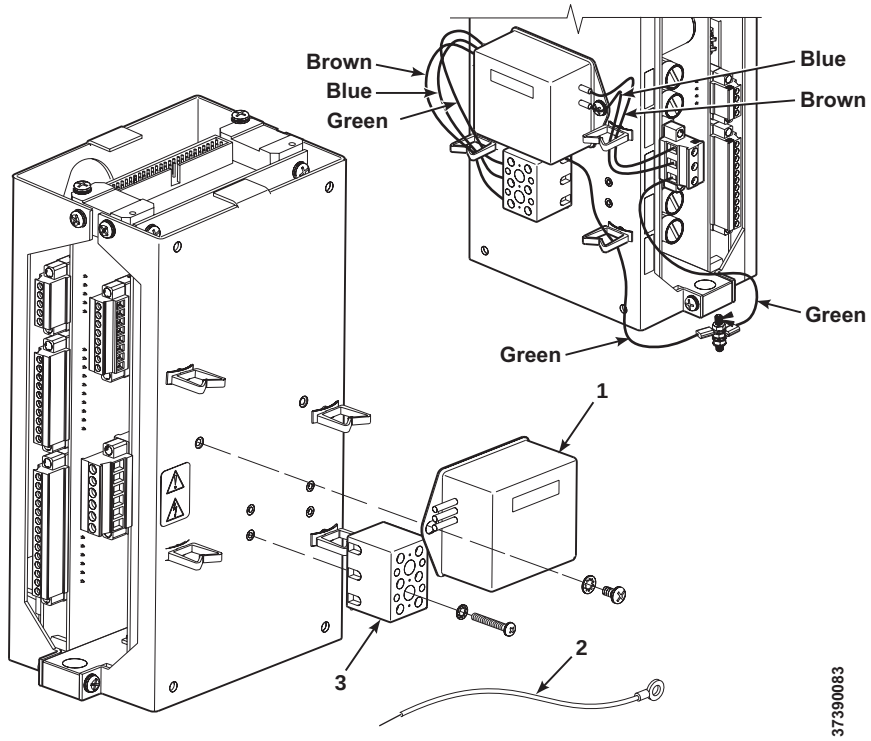
Remove Solenoid Valves

1. Disconnect solenoid leads from mating terminal connector.
2. Remove top nut of solenoid valve (15 or 16, Figure 6-22).
3. Remove the solenoid coil assembly and washer.
4. Unthread and remove solenoid valve base.

Remove EMI Filter and Terminal Block

1. Disconnect EMI filter wiring (Figure 6-23) at terminal block (3).
2. Disconnect EMI filter wiring at AC power input terminal block on electronic stack.
3. Unbolt and remove EMI filter (1) from electronic stack.
4. Remove ground wire (2) from terminal block (3).
5. Unbolt and remove terminal block (3) from electronic stack.

Figure 6-23. Removal/ Installation of EMI Filter



Electronics Housing Assembly

Install EMI Filter and Terminal Block

1. Install replacement EMI filter (1, Figure 6-23) and/or terminal block (3) on electronic stack.
2. Refer to wiring details in Figure 6-23. Connect EMI filter wiring and ground wire (2) at terminal block (3).
3. Connect EMI filter wiring at AC power input terminal block on electronic stack.

Install Solenoid Valves

1. Disassemble replacement solenoid valve (15 or 16, Figure 6-22).
2. Install new solenoid valve base. Be careful not to overtighten.
3. Install new washer and solenoid coil assembly and secure with nut.
4. Connect the solenoid leads to the proper terminations on the solenoid power terminal block (Figure 6-26).

Install Electronics Stack

1. Install electronics stack (5, Figure 6-22) and secure with lockwashers (14) and screws (13).
2. See Figure 6-25 and Figure 6-26. Reconnect power cable, signal cable, and solenoid lead connectors to electronics stack terminals.

Install Flash PROM

⚠CAUTION

Electrostatic discharge (ESD) protection is required to avoid damage to the electronic circuits.

1. Locate Flash PROM access port in electronics stack (5, Figure 6-22).
2. See Figure 6-24. Align Flash PROM (6, Figure 6-22) with mating receptacle in access port of electronics stack as shown. Flash PROM corner bevel must be in upper left corner of receptacle.
3. Install Flash PROM (6).

Figure 6-24. Flash PROM Alignment

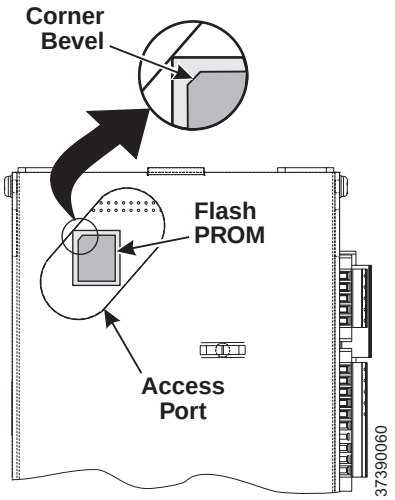


Figure 6-25. Electronics Housing
Cable Connections

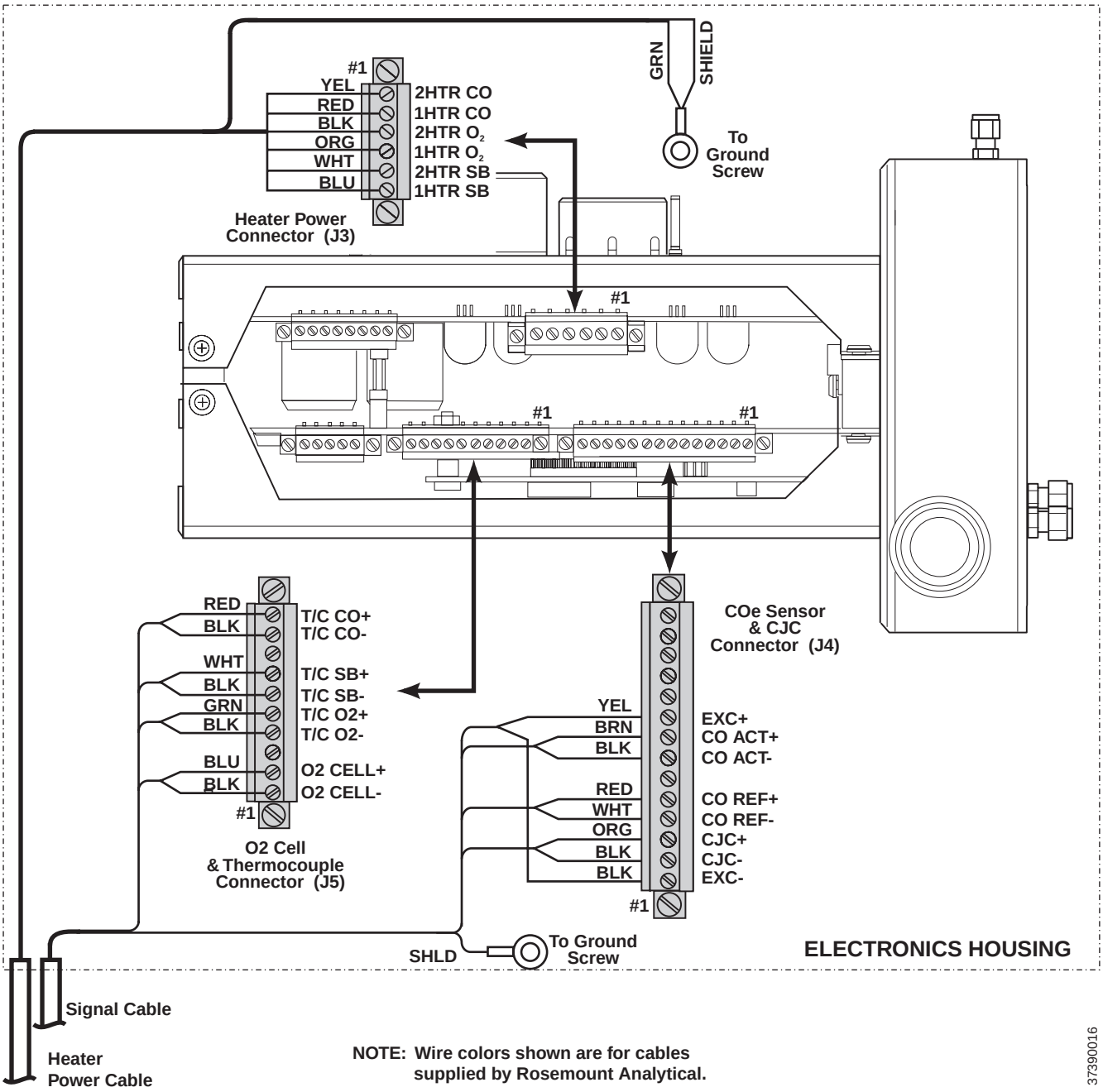
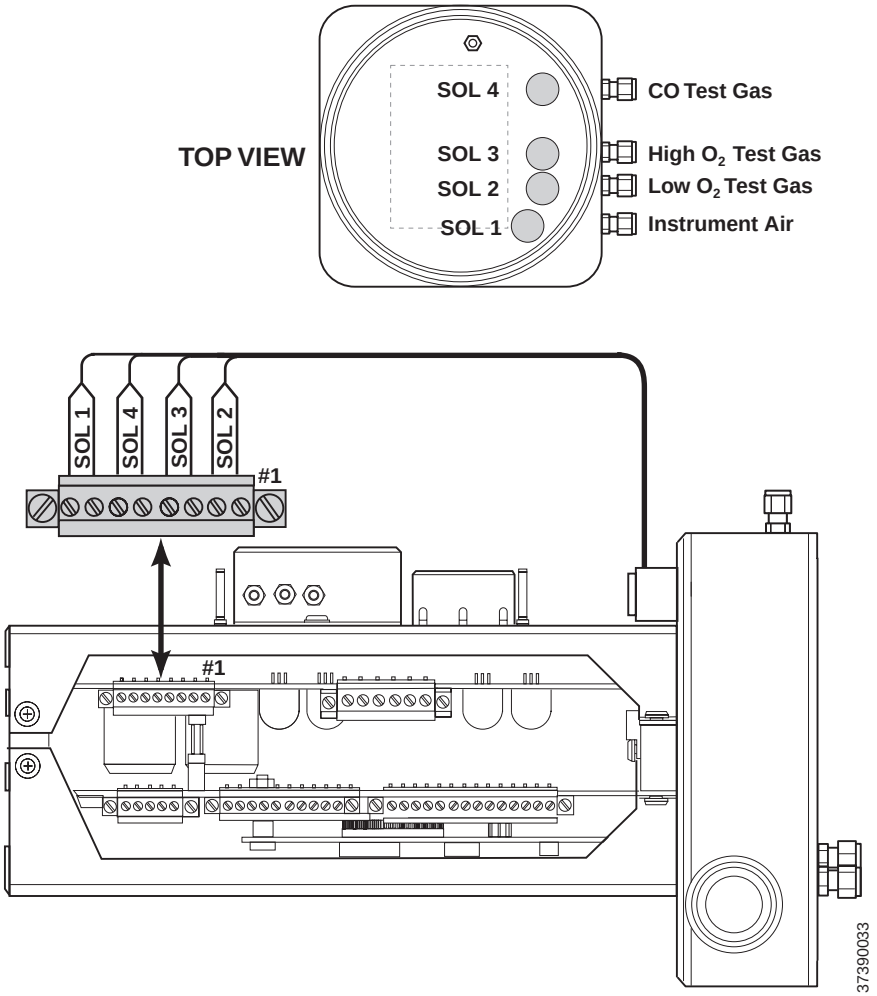


Figure 6-26. Solenoid Power Terminals



Install Cover

1. If removed, install cover gasket (4, Figure 6-22). Screw cover (3) onto electronics housing. Tighten cover firmly. Align locking clip (2) with gap between cover ribs.
2. Loosen screw (1) and slide locking clip (2) fully into gap between cover ribs. Retighten screw (1).

REPLACE TUBE FITTINGS

The OCX transmitter housings have special tube fittings that, if clogged or damaged, must be replaced with the same type of fitting. The special tube fittings have alpha or numeric codes etched on the fitting. Unetched tube fittings are standard 1/4 inch, stainless steel fittings.

'E' Type Fitting
The 'E' type fitting is an eductor drive air fitting for the OCX 8800 general purpose sensor housing. It is a 1/8 inch tube fitting with a built-in 0.011 inch restrictor orifice. It seats in a threaded base port inside the housing.

'R' Type Fitting
The 'R' type fitting is a reference air line fitting for the general purpose and hazardous area sensor housings. This is a 1/4 inch tube fitting with a built-in 0.007 inch restrictor orifice.

Remove Tube Fittings

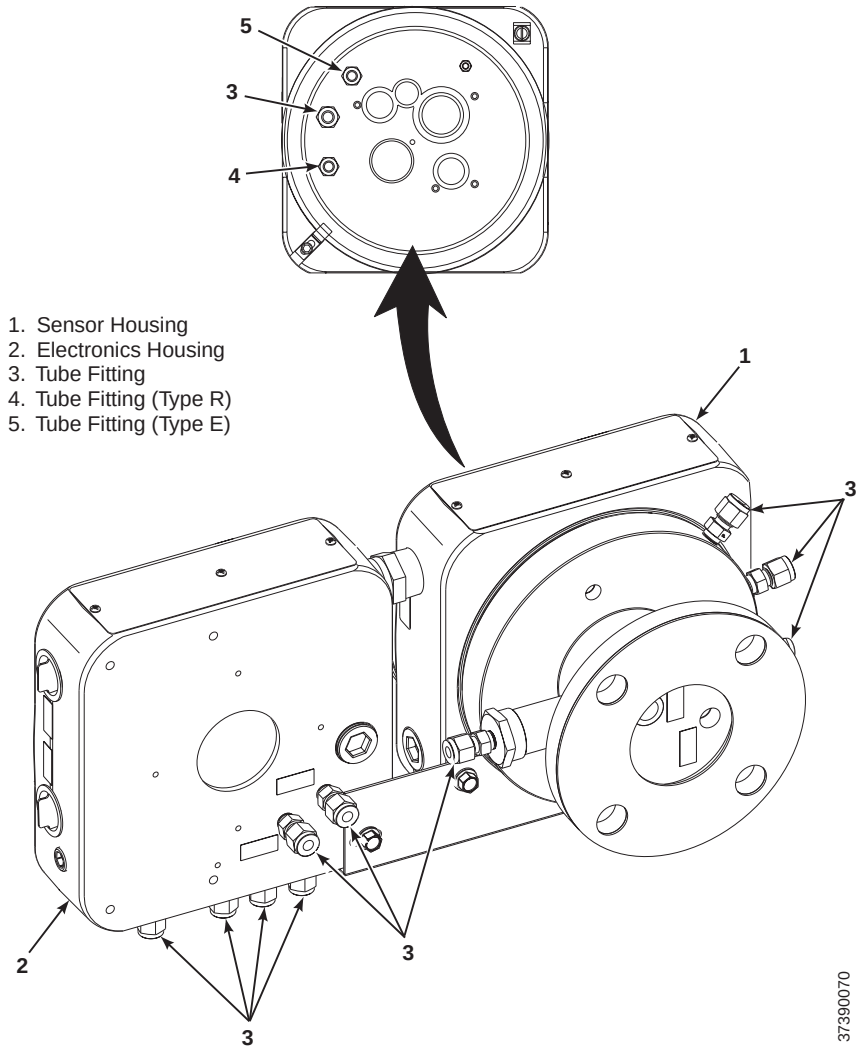
The OCX construction includes pipe thread sealant to seal fittings in all ports that pass through to an outer wall of the instrument housing base. Use the following instructions to loosen and remove tube fittings that are secured with pipe thread sealant.

⚠WARNING

Use heat resistant gloves when removing a damaged tube fitting. The pipe threads are bonded with a pipe thread sealant. The thread sealant softens at 450°F (232°C). The heated parts can cause severe burns.

1. Secure sensor housing (1, Figure 6-27) or electronics housing (2) in soft (plastic, wood, or brass) vice jaws.
2. To soften the pipe thread sealant, use a propane torch to heat the tube fitting (3, 4, or 5) to 450°F (232°C), minimum.
3. While heating the tube fitting, use a wrench to apply removal torque until the pipe thread sealant softens. Remove and discard the used fitting.
4. Use MEK or methylene chloride solvent to clean thread sealant residue from the internal pipe threads in the housing. Refer to applicable MSDS sheet for solvent handling precautions.

Figure 6-27. Removal of Tube Fittings



Install Tube Fittings

1. Verify that the replacement tube fitting is identical to the item removed. Special fittings are etched with code markings.
2. Apply pipe thread sealant (Loctite #567) to the mating threads of the tube fitting. Do not apply sealant to the first turn of the external pipe threads.
3. Install and tighten the tube fitting in the mating port of sensor or electronics housing.

Section 7 Troubleshooting

Overview . . . . . **page 7-1**
Diagnostic Alarms . . . . . **page 7-2**
Fault Isolation . . . . . **page 7-3**
Alarm Relay Events . . . . . **page 7-11**

⚠WARNING

Install all protective equipment covers and safety ground leads after troubleshooting. Failure to install covers and ground leads could result in serious injury or death.

OVERVIEW

The troubleshooting section describes how to identify and isolate faults that may develop in the OCX 8800. When troubleshooting the OCX 8800, reference the following information.

Grounding

It is essential that adequate grounding precautions are taken when installing the system. Thoroughly check both the probe and electronics to ensure the grounding quality has not degraded during fault finding. The system provides facilities for 100% effective grounding and total elimination of ground loops.

Electrical Noise

The OCX 8800 has been designed to operate in the type of environment normally found in a boiler room or control room. Noise suppression circuits are employed on all field terminations and main inputs. When fault finding, evaluate the electrical noise being generated in the immediate circuitry of a faulty system. Ensure all cable shields are connected to earth.

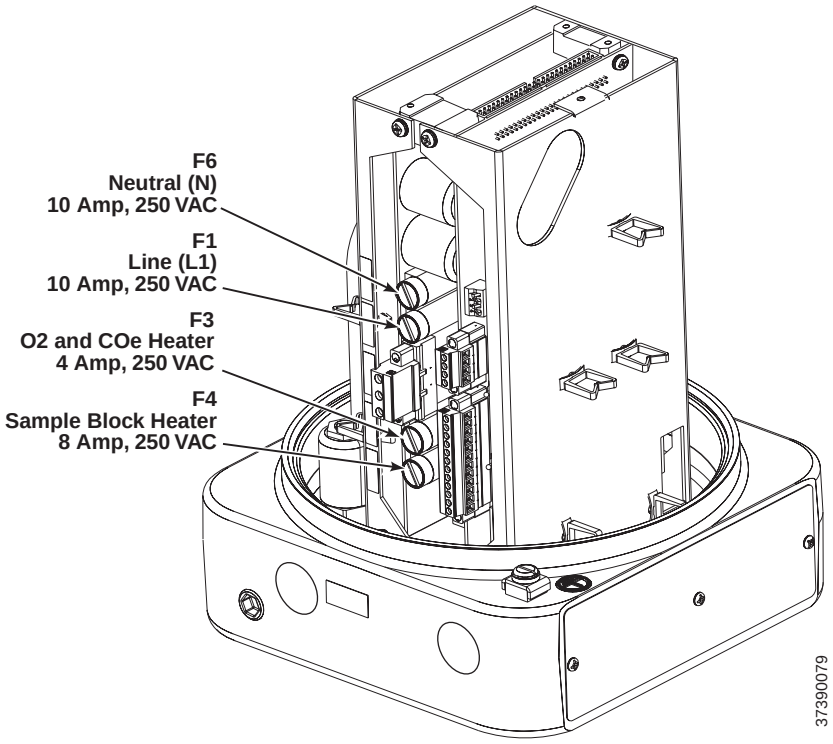
Electrostatic Discharge

Electrostatic discharge can damage ICs in the electronics. Before removing or handling the processor board or the ICs, ensure you are at ground potential.

Total Power Loss

In the event that the OCX 8800 will not power up at all, check the incoming power supply to make sure power is being delivered to the OCX 8800. If the incoming power supply is good, then check fuses F1 and F6 in the electronics housing. Refer to Figure 7-1 for fuse locations.

Figure 7-1. Fuse Locations



DIAGNOSTIC ALARMS

⚠CAUTION

Always install a blocking diode on the customers relay coil. Failure to install a blocking diode may create noise spikes and cause faults in the OCX electronics.

The OCX 8800 is equipped with a set of alarm relay contacts on the microprocessor board in the electronics housing. This set of dry contacts can be connected to any customer supplied relay device, 30 VDC, 30 mA maximum. **A blocking diode is required on the customers relay coil.**

Any fault condition in the OCX 8800 will trip the alarm relay. The optional SPA with HART programmable alarm indicates LOW O2, HIGH COe, Calibration Status, and Unit Failure. For more information refer to Appendix B - SPA with HART Alarm.

FAULT ISOLATION

Faults in the OCX 8800 Transmitter are indicated by messages displayed on the HART communicator. Fault indications that can appear are listed in Table 7-1, Troubleshooting.

If a fault is indicated on the HART communicator, locate the fault indication in Table 7-1. For each fault listed, there are related Probable Causes and Recommended Corrective Actions. The Probable Causes are listed in the order of most probable to least probable. Starting with the most probable cause, inspect and test the unit to isolate the actual cause, then use the Recommended Corrective Action listed to correct the problem.

Table 7-1. Troubleshooting

O2 Sensor R High ***(Oxygen sensor resistance high, > 5000 Ohms)*** **O2 Sensor Open** ***(Oxygen sensor disconnected)***	
Probable Cause	**Recommended Corrective Action**
Loose or open O_2 cell circuit connection	Check O_2 cell circuit wires for breaks or loose connections. Repair lead wire break or loose connections.
O_2 cell degraded or failed	Check O_2 cell impedance by reading the O2 Snsr R value via HART (see Figure 4-3, sheet 2). If cell impedance is zero, replace O_2 cell with cell replacement kit. If cell impedance is less than 5000 ohms, check for cell housing ground fault. Repair ground fault. If cell impedance is greater than 5000 ohms and no ground fault is indicated, replace O_2 cell with cell replacement kit.
Ref Current Err ***(RTD excitation current error)***	
Probable Cause	**Recommended Corrective Action**
Loose or open lead or circuit wire connection for COe sensor or CJC sensor current loop	Check all COe and CJC sensor current loop wiring per Figure 7-3 and Figure 6-7. Correct wiring faults.
COe sensor grounded	Check resistance of COe sensor leads to ground per Figure 6-7. Replace COe sensor if resistance is less than 10M Ohms.
COe sensor failed	Check resistance of both COe sensor elements per Figure 6-7. Replace COe sensor if resistance of sensor element is not between 100 and 250 Ohms.
CJC sensor grounded	Check resistance of CJC sensor to ground per Figure 6-7. Replace CJC sensor if resistance is less than 10M Ohms.
CJC sensor failed	Check resistance of CJC sensor per Figure 6-7. Replace CJC sensor if resistance of sensor is not between 100 and 150 Ohms.
O2 Temp Hi ***(Oxygen sensor heater temperature high, > 750ºC)***	
Probable Cause	**Recommended Corrective Action**
High noise in OCX power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.
COe Temp Hi ***(Combustion sensor heater temperature high, 310ºC)***	
Probable Cause	**Recommended Corrective Action**
High noise in OCX power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.

Table continued on next page

SB Temp Hi ***(Sample block heater temperature high, > 190ºC)***	
Probable Cause	**Recommended Corrective Action**
High noise in OCX power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.

O2 Temp Very Hi ***(Oxygen sensor heater over maximum temperature, > 820ºC)*** **O2 Htr Rmp Rate** ***(Oxygen sensor heater over maximum temperature ramp rate)***	
Probable Cause	**Recommended Corrective Action**
Incorrect O_2 heater wiring	Check O_2 heater wiring per Figure 7-3 and Figure 6-6. Check the wiring at the heater and inside the electronics housing. Correct wiring fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Incorrect O_2 thermocouple wiring	Check O_2 thermocouple wiring per Figure 7-3 and Figure 6-6. Check the wiring at the thermocouple and inside the electronics housing. Correct wiring fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Electronics package failure	Replace electronics package.

COe Temp Very Hi ***(Combustion sensor heater over maximum temperature, > 400ºC)*** **COe Htr Rmp Rate** ***(Combustibles sensor heater over maximum temperature ramp rate)***	
Probable Cause	**Recommended Corrective Action**
Incorrect COe heater wiring	Check COe heater wiring per Figure 7-3 and Figure 6-7. Check the wiring at the heater and inside the electronics housing. Correct wiring fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Incorrect COe thermocouple wiring	Check COe thermocouple wiring per Figure 7-3 and Figure 6-7. Check the wiring at the thermocouple and inside the electronics housing. Correct wiring fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Electronics package failure	Replace electronics package.

SB Temp Very Hi ***(Sample block heater over maximum temperature, > 260ºC)*** **SB Htr Rmp Rate** ***(Sample block heater over maximum temperature ramp rate)***	
Probable Cause	**Recommended Corrective Action**
Incorrect sample block heater wiring	Check sample block heater wiring per Figure 7-3 and Figure 6-6. Check the wiring at the heater and inside the electronics housing. Correct wiring fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Incorrect sample block thermocouple wiring	Check sample block thermocouple wiring per Figure 7-3 and Figure 6-6. Check the wiring at the thermocouple and inside the electronics housing. Correct wiring fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Electronics package failure	Replace electronics package.

O2 TC Open ***(Oxygen sensor heater thermocouple open)***	
Probable Cause	**Recommended Corrective Action**
O_2 thermocouple or thermocouple circuit open	Check O_2 thermocouple and circuit wires for breaks or loose connections per Figure 7-3 and Figure 6-6. Repair breaks or loose connections or replace failed thermocouple. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.

COe TC Open ***(Combustibles sensor heater thermocouple open)***	
Probable Cause	**Recommended Corrective Action**
Combustibles sensor thermocouple open	Check thermocouple resistance (lead to ground) of reference and active thermocouples per Figure 7-3 and Figure 6-7. If either thermocouple is open or shorted to ground, replace combustibles sensor.

Table continued on next page

SB TC Open ***(Sample block heater thermocouple open)***	
Probable Cause	**Recommended Corrective Action**
Sample block thermocouple or thermocouple circuit open	Check sample block thermocouple and circuit wires for breaks or loose connections per Figure 7-3 and Figure 6-6. Repair breaks or loose connections or replace failed thermocouple. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.

O2 TC Shorted ***(Oxygen sensor heater thermocouple shorted)***	
Probable Cause	**Recommended Corrective Action**
O_2 thermocouple or thermocouple circuit shorted	Check O_2 thermocouple and circuit wires for short circuit condition per Figure 7-3 and Figure 6-6. Repair shorted wiring or replace failed thermocouple. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Slow heatup during cold start	Perform Reset procedure in Section 3, Configuration and Startup to continue operation. If alarm persists, refer to the O2 Htr Failure alarm procedure.

COe TC Shorted ***(Combustibles sensor heater thermocouple shorted)***	
Probable Cause	**Recommended Corrective Action**
Combustibles sensor thermocouple shorted	Check thermocouple resistance (lead to ground) of reference and active thermocouples per Figure 7-3 and Figure 6-7. If either thermocouple is open or shorted to ground, replace combustibles sensor.
Slow heatup during cold start	Perform Reset procedure in Section 3, Configuration and Startup to continue operation. If alarm persists, refer to the COe Htr Failure alarm procedure.

SB TC Shorted ***(Sample block heater thermocouple shorted)***	
Probable Cause	**Recommended Corrective Action**
Sample block thermocouple or thermocouple circuit shorted	Check sample block thermocouple and circuit wires for short circuit condition per Figure 7-3 and Figure 6-6. Repair shorted wiring or replace failed thermocouple. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.
Slow heatup during cold start	Perform Reset procedure in Section 3, Configuration and Startup to continue operation. If alarm persists, refer to the SB Htr Failure alarm procedure.

O2 TC Reversed ***(Oxygen sensor heater thermocouple reversed)***	
Probable Cause	**Recommended Corrective Action**
O_2 thermocouple wires reversed	Check O_2 thermocouple wiring per Figure 7-3 and Figure 6-6. Check the wiring at the sensor and inside the electronics housing. Correct reversed-wires fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.

COe TC Reversed ***(Combustibles sensor block heater thermocouple reversed)***	
Probable Cause	**Recommended Corrective Action**
Combustibles thermocouple wires reversed	Check combustibles thermocouple wiring per Figure 7-3 and Figure 6-7. Check the wiring at the sensor and inside the electronics housing. Correct reversed-wires fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.

SB TC Reversed ***(Sample block heater thermocouple reversed)***	
Probable Cause	**Recommended Corrective Action**
Sample block thermocouple wires reversed	Check sample block thermocouple wiring per Figure 7-3 and Figure 6-6. Check the wiring at the sensor and inside the electronics housing. Correct reversed-wires fault. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.

Table continued on next page

ADC Failure ***(Voltage to digital conversion could not complete)*** **ADC Ref Error** ***(Voltage to digital conversion not accurate)***	
Probable Cause	**Recommended Corrective Action**
Incorrect wiring between electronics and sensor housings	Check all wiring between the electronics and sensor housings per Figure 7-3. Correct wiring faults.
Electronics package failure	Replace electronics package.

O2 Htr Failure ***(Oxygen sensor heater could not reach final temperature)***	
Probable Cause	**Recommended Corrective Action**
O_2 heater circuit wiring open	Check O_2 cell heater circuit for broken wire or loose connection per Figure 7-3 and Figure 6-6. Repair broken wire or loose connection.
O_2 heater open	Check resistance of O_2 heater per Figure 6-6. Normal O_2 heater resistance is 62.5 Ohms. Replace O_2 heater if heater is open or has a large resistance.
Heater electronics failure	Check heater fuse F3 in electronics housing per Figure 7-1. If open, locate and correct cause of overload. If F3 is not open, or if cause of overload cannot be found, replace electronics package.

COe Htr Failure ***(Combustibles sensor heater could not reach final temperature)***	
Probable Cause	**Recommended Corrective Action**
COe heater circuit wiring open	Check COe heater circuit for broken wire or loose connection per Figure 7-3 and Figure 6-7. Repair broken wire or loose connection.
COe heater open	Check resistance of COe heater per Figure 6-7. Normal COe heater resistance is 97.7 Ohms. Replace COe heater if heater is open or has a large resistance.
Heater electronics failure	Check heater fuse F3 in electronics housing per Figure 7-1. If open, locate and correct cause of overload. If F3 is not open, or if cause of overload cannot be found, replace electronics package.

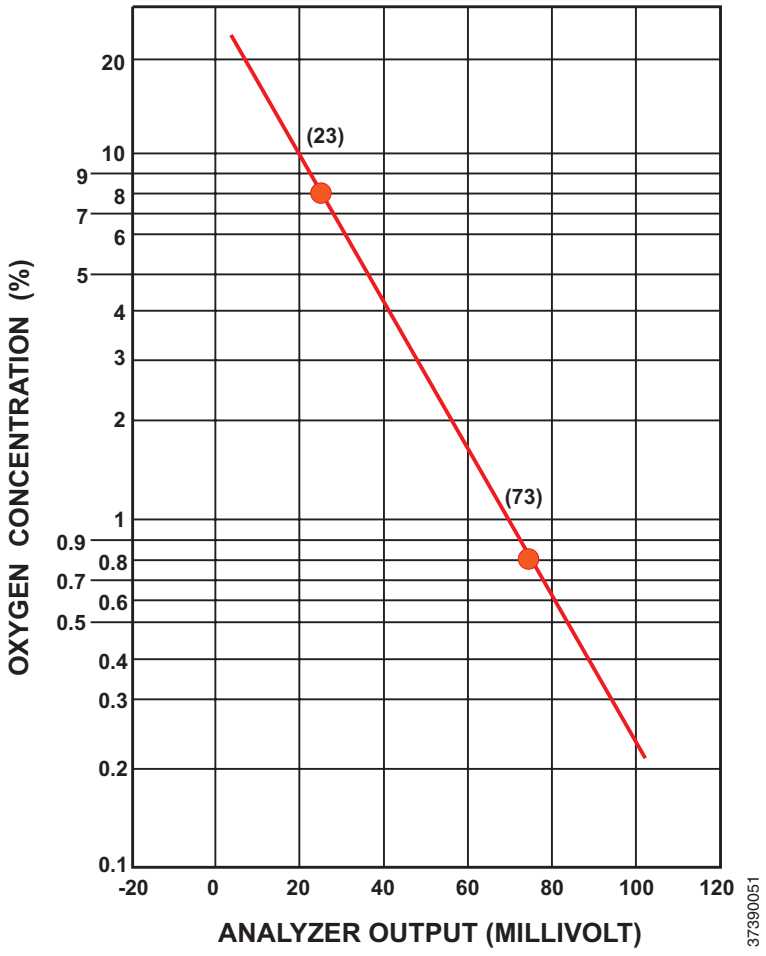
SB Htr Failure ***(Sample block heater could not reach final temperature)***	
Probable Cause	**Recommended Corrective Action**
Sample block heater circuit wiring open	Check sample block heater circuit for broken wire or loose connection per Figure 7-3 and Figure 6-6. Repair broken wire or loose connection.
Sample block heater open	Check resistance of sample block heater per Figure 6-6. Normal sample block heater resistance is 36.4 Ohms each (18.2 Ohms with both heaters in parallel). Replace sample block heater if heater is open or has a large resistance.
Heater electronics failure	Check heater fuse F4 in electronics housing per Figure 7-1. If open, locate and correct cause of overload. If F4 is not open, or if cause of overload cannot be found, replace electronics package.
Sensor housing exposed to high wind and/or extreme cold temperatures	If above probable causes are not causing the SB heater failure, install flange insulator (PN 6P00162H01).

Table continued on next page

Cal Warning *(Calibration warning)* Cal Failed *(Calibration failed)*	
Probable Cause	**Recommended Corrective Action**
Calibration gas supply low or gas connection leaking	Check calibration gas supplies and connections. Adjust gas pressure and flow. Replenish low calibration gas supplies and tighten or repair loose or leaking connections. When calibration gas supplies are adequate, recalibrate.
O_2 cell degraded or failed	Check O_2 cell impedance by reading the O2 Snsr R value via HART (see Figure 4-3, sheet 2). If cell impedance is zero, replace O_2 cell. If cell impedance is less than 5000 ohms, check for cell housing ground fault. Repair ground fault. If cell impedance is greater than 5000 ohms and no ground fault is indicated, replace O_2 cell. Flow calibration gas to the O_2 cell. Read the cell millivolt output. Plot the cell millivolt output and the calibration gas O_2 concentration on the chart shown in Figure 7-2. If the plotted values do not fall on the slope line shown in Figure 7-2, replace the O_2 cell.
COe sensor degraded	Replace COe sensor or increase warning level (**SYSTEM**, **CALIB SETUP**, **COe Slope Warn** via HART.)
Low sample gas flow in sensor housing due to flow path plugging	Check the following portions of the flow path for plugging: • blowback filter • in-situ filter • eductor outlet path

Table continued on next page

Figure 7-2. Oxygen and Cell Output



Board Temp Hi ***(Electronics temperature maximum exceeded, > 85ºC)***	
Probable Cause	**Recommended Corrective Action**
Electronics housing exposed to high ambient temperature	Insulate housing from source of high temperature and/or install cooling fan to remove heat from housing. Perform Reset procedure in Section 3, Configuration and Startup to continue operation.

EEPRM Chksm Fail ***(Non-volatile parameter storage corrupted)***	
Probable Cause	**Recommended Corrective Action**
Unit powered down during calibration parameter storage	Perform Reset procedure in Section 3, Configuration and Startup. Recalibrate the OCX and check/trim analog outputs.
Flash PROM failure	Replace electronics package.

O2 Temp Low ***(Oxygen sensor heater temperature low, < 710ºC)***	
Probable Cause	**Recommended Corrective Action**
Sensor housing exposed to high wind and/or extreme cold temperatures	Install sensor housing flange insulator (PN 6P00162H01).
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install filter power line kit (PN 6A00171G01) or high quality line filter for input power.

COe Temp Low ***(Combustion sensor heater temperature low, < 290ºC)***	
Probable Cause	**Recommended Corrective Action**
Sensor housing exposed to high wind and/or extreme cold temperatures	Install sensor housing flange insulator (PN 6P00162H01).
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.

SB Temp Low ***(Sample block heater temperature low, < 150ºC)***	
Probable Cause	**Recommended Corrective Action**
Sensor housing exposed to high wind and/or extreme cold temperatures	Install sensor housing flange insulator (PN 6P00162H01).
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.

Line Freq Error ***(AC power line frequency out of usable range, < 45 Hz or > 66 Hz)***	
Probable Cause	**Recommended Corrective Action**
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.
AC power line frequency is outside the usable range of the OCX universal power supply	Correct power supply frequency. AC power line frequency must be between 50 and 60 Hz.
Electronics package failure	Check power supply frequency with a calibrated oscilloscope or frequency meter and compare with line frequency. Replace electronics package if they do not agree within 1 Hz.

Line Voltage Low ***(AC power line voltage below minimum, < 85 VAC)***	
Probable Cause	**Recommended Corrective Action**
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.
Electronics package failure	Check power supply voltage and compare with line voltage. Replace electronics package if they do not agree within 5%.

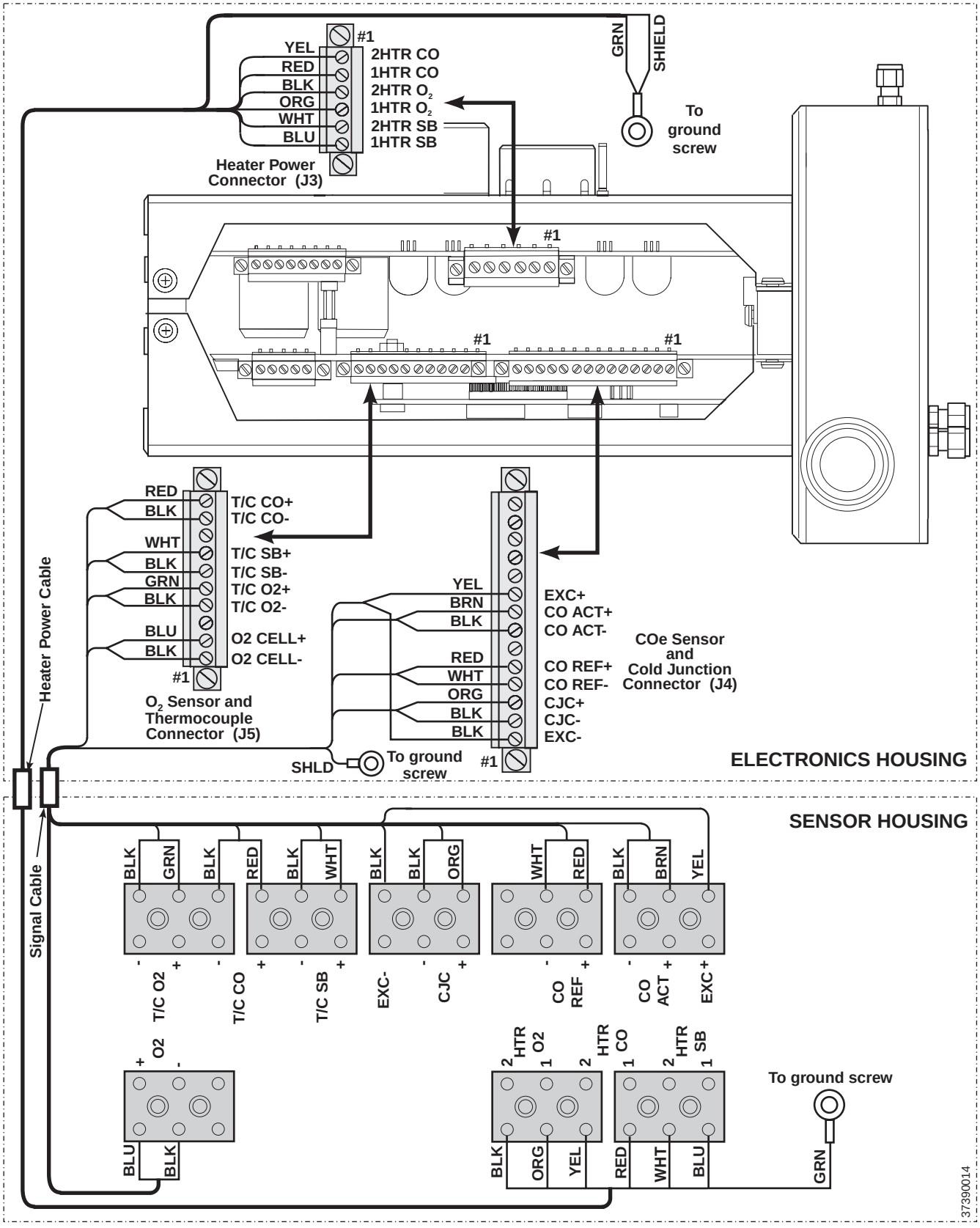
Table continued on next page

Line Voltage High ***(AC power line voltage above maximum, > 278 VAC)***	
Probable Cause	**Recommended Corrective Action**
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.
Electronics package failure	Check power supply voltage and compare with line voltage. Replace electronics package if they do not agree within 5%.

Htr Relay Failed ***(Heater relay failure)***	
Probable Cause	**Recommended Corrective Action**
High noise or voltage fluctuations in power supply	Check power supply for line noise or voltage fluctuations. Install power line filter kit (PN 6A00171G01) or high quality line filter for input power.
Electronics package failure	Replace electronics package.

Out Brd Failure ***(Output board failure)***	
Probable Cause	**Recommended Corrective Action**
Electronics package failure	Replace electronics package.

Figure 7-3. Electrical Connections Between Electronics and Sensor Housing



ALARM RELAY EVENTS

The OCX 8800 contains an alarm relay that can be configured to activate on one of twelve different groups of events. These event groups, and the conditions that trigger them, are listed in Table 7-2, Alarm Relay Event Groups.

Table 7-2. Alarm Relay Event Groups

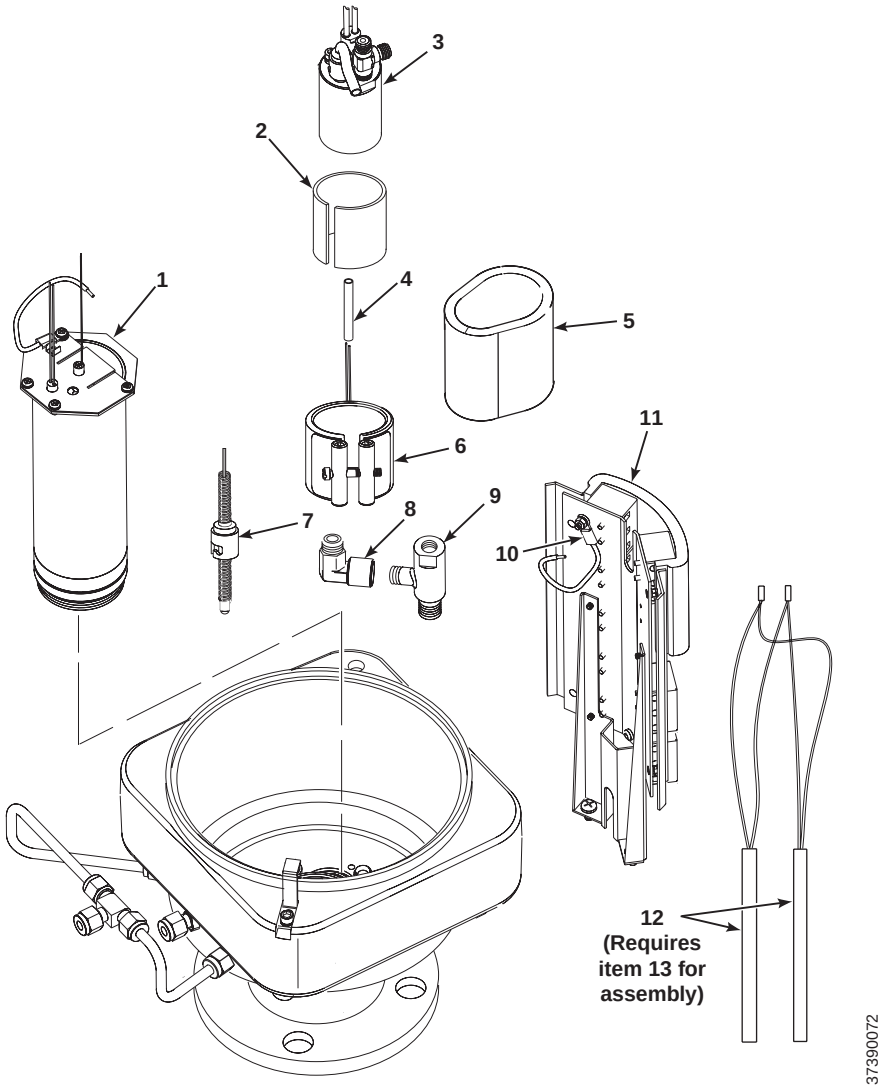
Alarm Relay Event	Alarms/Conditions
In Calibration	Calibration in progress
O_2 Temperature Error	Oxygen sensor heater temperature low *(O2 Temp Low)* Oxygen sensor heater temperature high *(O2 Temp Hi, O2 Temp Very Hi)* RTD excitation current error *(Ref Curr Err)*
Heater Failure	Oxygen sensor heater could not reach final temperature *(O2 HTR Failure)* Combustibles sensor heater could not reach final temperature *(COe Htr Failure)* Sample Block sensor heater could not reach final temperature *(SB Htr Failure)*
O_2 Sensor Error	Oxygen sensor resistance high *(O2 Sensor R High)* Oxygen sensor disconnected *(O2 Sensor Open)*
Calibration Failure	Calibration failed *(Cal Failed)*
Calibration Warning	Calibration warning *(Cal Warning)*
Board Temperature High	Electronics temperature maximum exceeded *(Board Temp Hi)*
Unit Failure	Any non-recoverable or heater relay off alarm *(O2 Temp Hi, O2 Temp Very Hi, COe Temp Hi, COE Temp Very Hi, SB Temp Hi, SB Temp Very Hi, O2 Htr Ramp Rate, COe Htr Rmp Rate, SB Htr Ramp Rate, O2 TC Shorted, O2 TC Reversed, COe TC Shorted, COe TC Reversed, SB TC Shorted, SB TC Reversed, ADC Failure, ADC Ref Error, Board Temp Hi, EEPRM Chksm Fail, Line Freq Error, Line Voltage Low, Line Voltage Hi, Htr Relay Failed, Out Brd Fail)*
Sample Block Temperature Error	Sample block heater temperature low *(SB Temp Low)* Sample block heater temperature high *(SB Temp Hi, SB Temp Very Hi)* RTD excitation current error *(Ref Curr Err)*
COe Sensor Temperature Error	Combustibles sensor heater temperature low *(COe Temp Low)* Combustibles sensor heater temperature high *(COe Temp Hi, COe Temp Very Hi)* RTD excitation current error *(Ref Curr Err)*
Power Input Error	AC power line frequency out of usable range *(Line Freq Err)* AC power line voltage below minimum *(Line Voltage Low)* AC power line voltage above maximum *(Line Voltage Hi)*
All Alarms	Any alarm

Section 8 Replacement Parts

Sensor Housing . . . . . **page 8-2**
Electronics Housing . . . . . **page 8-6**
O2 Cell and Heater Strut Assembly . . . . . **page 8-9**

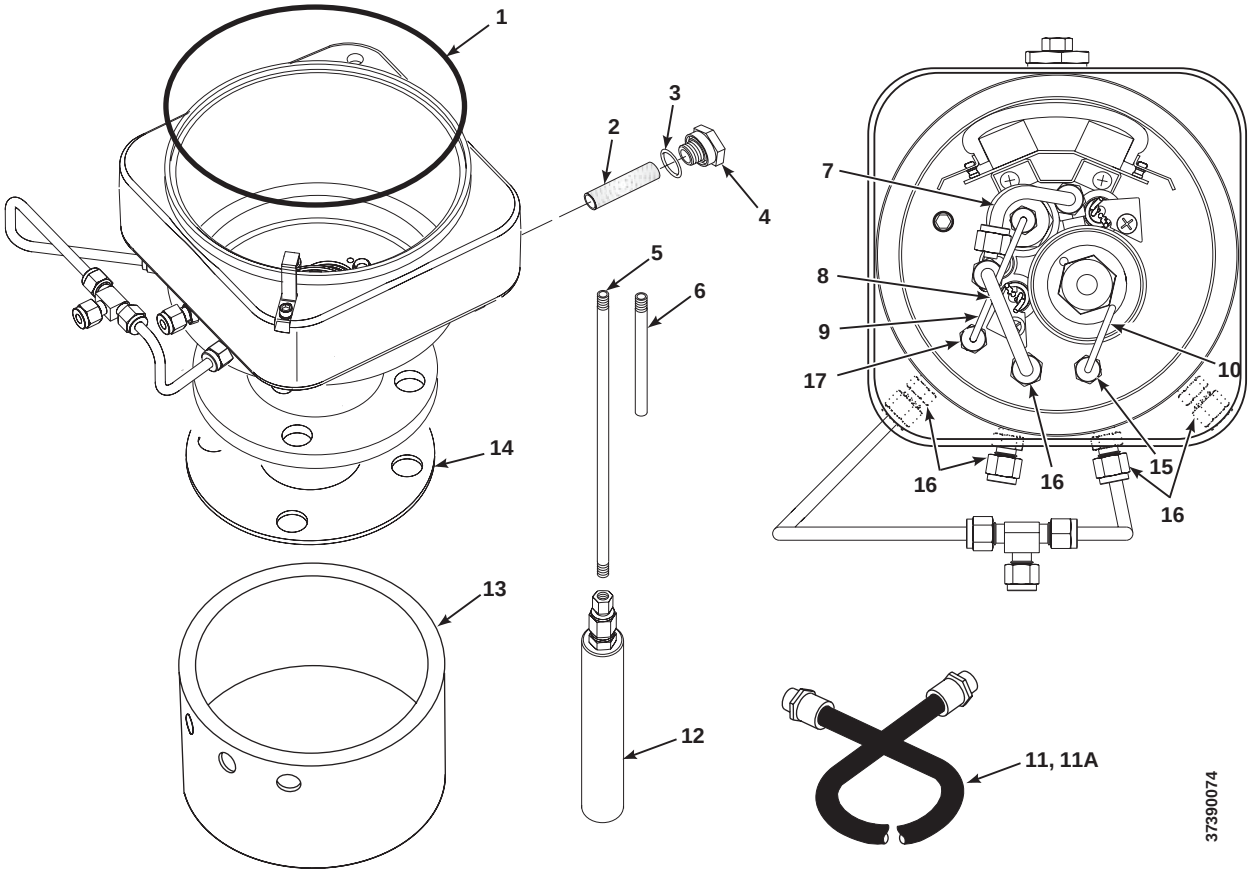
SENSOR HOUSING

Figure 8-1. Sensor Housing Components



Index No.	Part Number	Description
1	5R10190G02	O_2 Cell and Heater Assembly
2	6P00177H01	Heater Insulator, Mica
3	4851B46G03	Combustibles Sensor Replacement Kit
4	1A99786H01	Heater Leads Insulator, 11 inches long
5	6P00163H01	COe Insulator
6	1A99746H02	Band Heater
7	1A99749H01	Thermocouple
8	1A99747H01	Elbow
9	5R10200H01	Eductor
10	6A00123G01	CJC Sensor (RTD assembly, ring type)
11	6P00155H02	Insulator
12	1A98765H02	Heater Rod
13	1A99520H01	Watlube Heater Release Agent

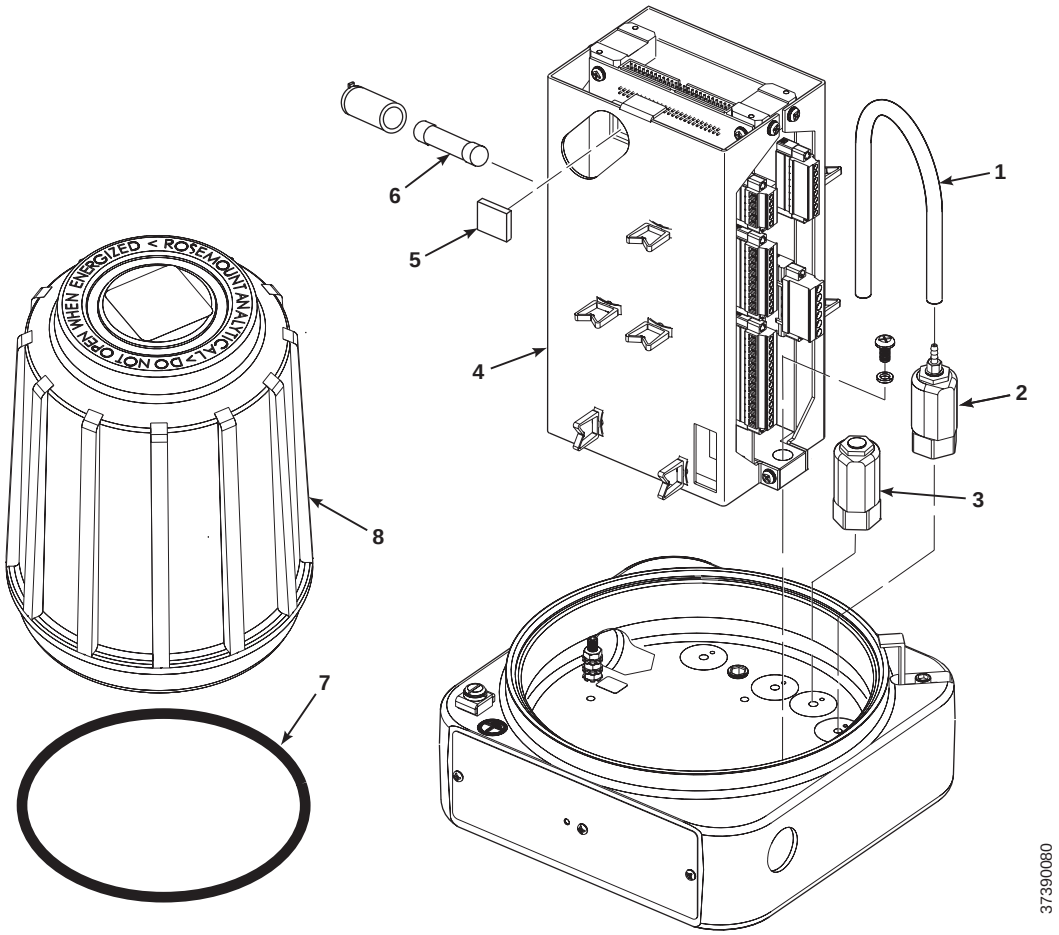
Figure 8-2. Sensor Housing Components



Index No.	Part Number	Description
1	1A99089H02	Cover Gasket (O-ring)
2	5R10246H02	Blowback Filter
3	1A98448H02	O-ring
4	5R10247H01	Adaptor
5	5R10183H02	Tube, Sample, 18 in. (457 mm) 316 Stainless steel
	5R10183H06	Tube, Sample, 18 in. (457 mm) Inconel 600
	5R10227G01	Tube, Sample, 18 in. (457 mm) Ceramic
	5R10183H03	Tube, Sample, 3 ft. (0.91 m) 316 Stainless steel
	5R10183H07	Tube, Sample, 3 ft. (0.91 m) Inconel 600
	5R10227G02	Tube, Sample, 3 ft. (0.91 m) Ceramic
	5R10183H04	Tube, Sample, 6 ft. (1.83 m) 316 Stainless steel
	5R10183H08	Tube, Sample, 6 ft. (1.83 m) Inconel 600
	5R10183H05	Tube, Sample, 9 ft. (2.7 m) 316 Stainless steel
	5R10183H09	Tube, Sample, 9 ft. (2.7 m) Inconel 600
6	5R10183H01	Tube, Exhaust
7	1A68017H02	COe Extractive
8	5R10185H08	Dilution Air Tube
9	5R10185H03	Eductor Drive Air Tube
10	5R10185H04	Reference Air Tube
11	6A00146G01	Heater Cable Assembly, Remote Electronics, 20 ft (6 m)
	6A00146G02	Heater Cable Assembly, Remote Electronics, 40 ft (12 m)
	6A00146G03	Heater Cable Assembly, Remote Electronics, 60 ft (18 m)
	6A00146G04	Heater Cable Assembly, Remote Electronics, 80 ft (24 m)
	6A00146G05	Heater Cable Assembly, Remote Electronics, 100 ft (30 m)
	6A00146G06	Heater Cable Assembly, Remote Electronics, 150 ft (45 m)
11A	6A00147G01	Signal Cable Assembly, Remote Electronics, 20 ft (6 m)
	6A00147G02	Signal Cable Assembly, Remote Electronics, 40 ft (12 m)
	6A00147G03	Signal Cable Assembly, Remote Electronics, 60 ft (18 m)
	6A00147G04	Signal Cable Assembly, Remote Electronics, 80 ft (24 m)
	6A00147G05	Signal Cable Assembly, Remote Electronics, 100 ft (30 m)
	6A00147G06	Signal Cable Assembly, Remote Electronics, 150 ft (45 m)
12	6A00144G01	In-situ Filter Kit
13	6P00162H01	Flange Insulator (optional)
14	3535B18H02	Flange Gasket, ANSI
	3535B45H01	Flange Gasket, DIN
15	5R10279G01	Tube Fitting, Type "R"
16	771B870H04	Tube Fitting, Standard
17	5R10279G02	Tube Fitting, Type "E"

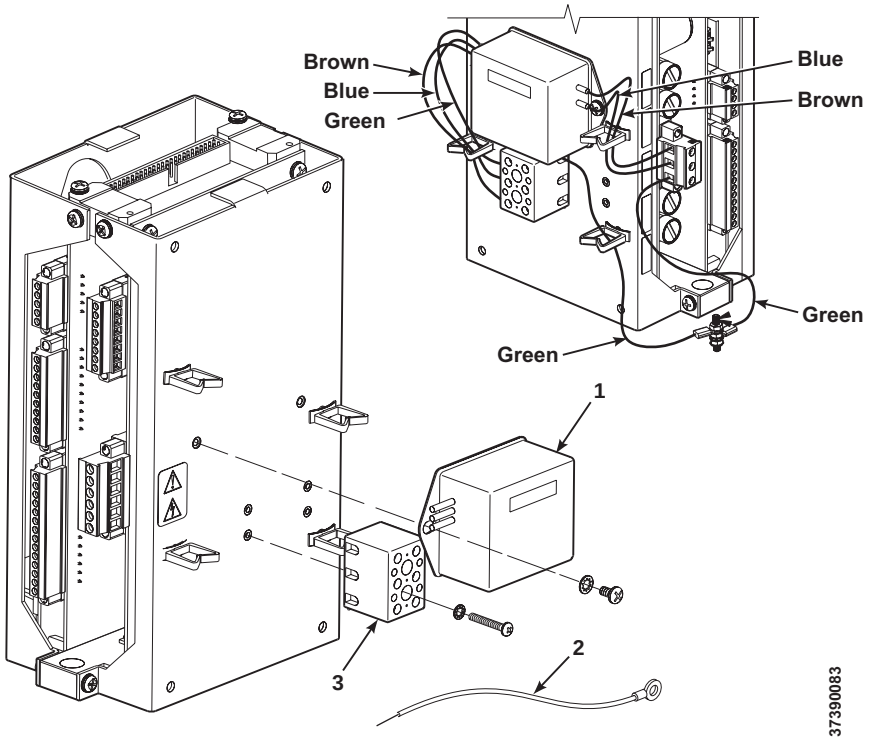
ELECTRONICS HOUSING

Figure 8-3. Electronics Housing Components



Index No.	Part Number	Description
1	1A97902H01	Hose
2	1A97905H02	Solenoid Valve, 3-Way
3	1A97905H01	Solenoid Valve, Test Gas
4	6A00132G01	Electronics Stack, HART
5	Special Order	Flash PROM, Programmed
6	1A97913H06	Fuse (F1 and F6), 10 Amp, 250 VAC
	1A99766H01	Fuse (F3), 4 Amp, 250 VAC
	1A99766H02	Fuse (F4), 8 Amp, 250 VAC
7	1A99089H02	Cover Gasket (O-ring)
8	5R10219G01	Cover, Blind
8A	5R10199G01	Cover, Window

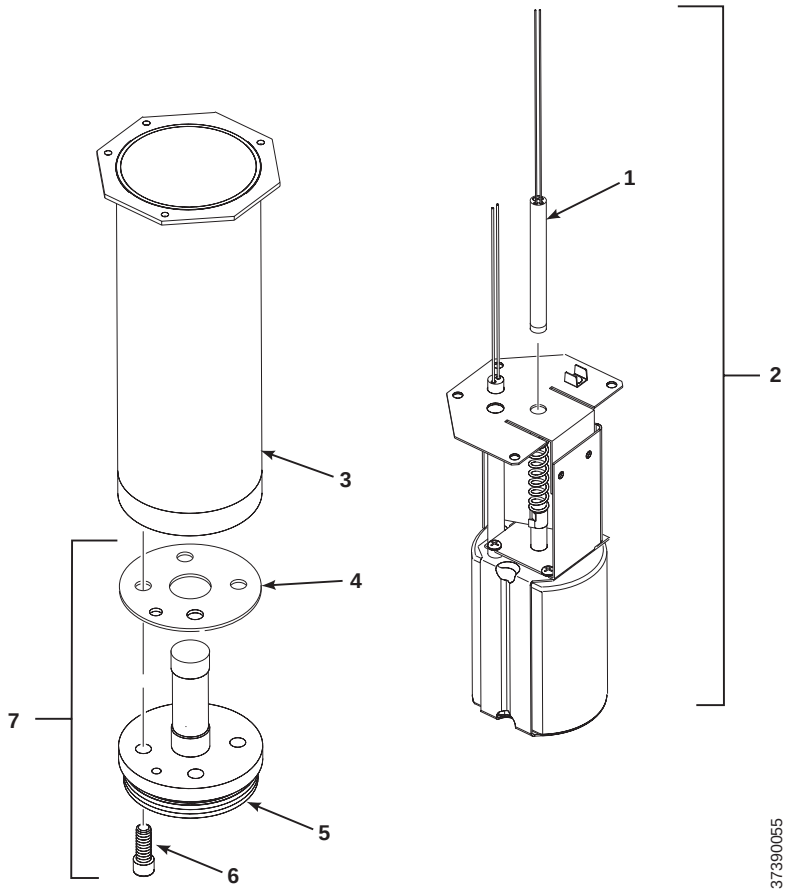
Figure 8-4. EMI Filter and Terminal Block



Index No.	Part Number	Description
1	1A98467H01	Filter, EMI
2	5R10238G01	Ground Wire
3	1A99714H01	Terminal Block

O_2 CELL AND HEATER STRUT ASSEMBLY

Figure 8-5. O_2 Cell and Heater Strut Assembly



Index No.	Part Number	Description
1	4851B44G01	Contact and Thermocouple Assembly
2	5R10211G02	Heater Strut Assembly
3	5R10188G01	Heater Tube
4	Ref	Gasket (part of O_2 Cell Replacement Kit, item 7)
5	Ref	O_2 Cell (part of O_2 Cell Replacement Kit, item 7)
6	Ref	Screw (part of O_2 Cell Replacement Kit, item 7)
7	4851B45G01	O_2 Cell Replacement Kit

Appendix A Safety Data

Safety Instructions . . . . . page A-2
Ceramic Fiber Products Material Safety Data Sheet . . . . page A-15
High Pressure Gas Cylinders . . . . . page A-21

SAFETY INSTRUCTIONS

IMPORTANT

SAFETY INSTRUCTIONS FOR THE WIRING AND INSTALLATION OF THIS APPARATUS

The following safety instructions apply specifically to all EU member states. They should be strictly adhered to in order to assure compliance with the Low Voltage Directive. Non-EU states should also comply with the following unless superseded by local or National Standards.

1. Adequate earth connections should be made to all earthing points, internal and external, where provided.
2. After installation or troubleshooting, all safety covers and safety grounds must be replaced. The integrity of all earth terminals must be maintained at all times.
3. Mains supply cords should comply with the requirements of IEC227 or IEC245.
4. All wiring shall be suitable for use in an ambient temperature of greater than 75°C.
5. All cable glands used should be of such internal dimensions as to provide adequate cable anchorage.
6. To ensure safe operation of this equipment, connection to the mains supply should only be made through a circuit breaker which will disconnect all circuits carrying conductors during a fault situation. The circuit breaker may also include a mechanically operated isolating switch. If not, then another means of disconnecting the equipment from the supply must be provided and clearly marked as such. Circuit breakers or switches must comply with a recognized standard such as IEC947. All wiring must conform with any local standards.
7. Where equipment or covers are marked with the symbol to the right, hazardous voltages are likely to be present beneath. These covers should only be removed when power is removed from the equipment - and then only by trained service personnel.

8. Where equipment or covers are marked with the symbol to the right, there is a danger from hot surfaces beneath. These covers should only be removed by trained service personnel when power is removed from the equipment. Certain surfaces may remain hot to the touch.

9. Where equipment or covers are marked with the symbol to the right, refer to the Operator Manual for instructions.

10. All graphical symbols used in this product are from one or more of the following standards: EN61010-1, IEC417, and ISO3864.

BELANGRIJK

Veiligheidsvoorschriften voor de aansluiting en installatie van dit toestel.

De hierna volgende veiligheidsvoorschriften zijn vooral bedoeld voor de EU lidstaten. Hier moet aan gehouden worden om de onderworpenheid aan de Laag Spannings Richtlijn (Low Voltage Directive) te verzekeren. Niet EU staten zouden deze richtlijnen moeten volgen tenzij zij reeds achterhaald zouden zijn door plaatselijke of nationale voorschriften.

1. Degelijke aardingsaansluitingen moeten gemaakt worden naar alle voorziene aardpunten, intern en extern.
2. Na installatie of controle moeten alle veiligheidsdeksels en -aardingen terug geplaatst worden. Ten alle tijde moet de betrouwbaarheid van de aarding behouden blijven.
3. Voedingskabels moeten onderworpen zijn aan de IEC227 of de IEC245 voorschriften.
4. Alle bekabeling moet geschikt zijn voor het gebruik in omgevingstemperaturen, hoger dan 75°C.
5. Alle wartels moeten zo gedimensioneerd zijn dat een degelijke kabel bevestiging verzekerd is.
6. Om de veilige werking van dit toestel te verzekeren, moet de voeding door een stroomonderbreker gevoerd worden (min 10A) welke alle draden van de voeding moet onderbreken. De stroomonderbreker mag een mechanische schakelaar bevatten. Zoniet moet een andere mogelijkheid bestaan om de voedingsspanning van het toestel te halen en ook duidelijk zo zijn aangegeven. Stroomonderbrekers of schakelaars moeten onderworpen zijn aan een erkende standaard zoals IEC947.
7. Waar toestellen of deksels aangegeven staan met het symbool is er meestal hoogspanning aanwezig. Deze deksels mogen enkel verwijderd worden nadat de voedingsspanning werd afgelegd en enkel door getraind onderhoudspersoneel.

8. Waar toestellen of deksels aangegeven staan met het symbool is er gevaar voor hete oppervlakken. Deze deksels mogen enkel verwijderd worden door getraind onderhoudspersoneel nadat de voedingsspanning verwijderd werd. Sommige oppper-vlakken kunnen 45 minuten later nog steeds heet aanvoelen.

9. Waar toestellen of deksels aangegeven staan met het symbool gelieve het handboek te raadplegen.

10. Alle grafische symbolen gebruikt in dit produkt, zijn afkomstig uit een of meer van devolgende standaards: EN61010-1, IEC417 en ISO3864.

VIGTIGT

Sikkerhedsinstruktion for tilslutning og installering af dette udstyr.

Følgende sikkerhedsinstruktioner gælder specifikt i alle EU-medlemslande. Instruktionerne skal nøje følges for overholdelse af Lavsspændingsdirektivet og bør også følges i ikke EU-lande medmindre andet er specificeret af lokale eller nationale standarder.

1. Passende jordforbindelser skal tilsluttes alle jordklemmer, interne og eksterne, hvor disse forefindes.
2. Efter installation eller fejlfinding skal alle sikkerhedsdæksler og jordforbindelser reetableres.
3. Forsyningskabler skal opfylde krav specificeret i IEC227 eller IEC245.
4. Alle ledningstilslutninger skal være konstrueret til omgivelsestemperatur højere end 75°C.
5. Alle benyttede kabelforskruninger skal have en intern dimension, så passende kabelaflastning kan etableres.
6. For opnåelse af sikker drift og betjening skal der skabes beskyttelse mod indirekte berøring gennem afbryder (min. 10A), som vil afbryde alle kredsløb med elektriske ledere i fejlsitua-tion. Afbryderen skal indholde en mekanisk betjent kontakt. Hvis ikke skal anden form for afbryder mellem forsyning og udstyr benyttes og mærkes som sådan. Afbrydere eller kontakter skal overholde en kendt standard som IEC947.
7. Hvor udstyr eller dæksler er mærket med dette symbol, er farlige spændinger normalt forekom-mende bagved. Disse dæksler bør kun afmonteres, når forsyningsspændingen er frakoblet - og da kun af instrueret servicepersonale.

8. Hvor udstyr eller dæksler er mærket med dette symbol, forefindes meget varme overflader bagved. Disse dæksler bør kun afmonteres af instrueret servicepersonale, når forsyningsspænding er frakoblet. Visse overflader vil stadig være for varme at berøre i op til 45 minutter efter frakobling.

9. Hvor udstyr eller dæksler er mærket med dette symbol, se da i betjeningsmanual for instruktion.

10. Alle benyttede grafiske symboler i dette udstyr findes i én eller flere af følgende standarder:- EN61010-1, IEC417 & ISO3864.

BELANGRIJK

Veiligheidsinstructies voor de bedrading en installatie van dit apparaat.

Voor alle EU lidstaten zijn de volgende veiligheidsinstructies van toepassing. Om aan de geldende richtlijnen voor laagspanning te voldoen dient men zich hieraan strikt te houden. Ook niet EU lidstaten dienen zich aan het volgende te houden, tenzij de lokale wetgeving anders voorschrijft.

1. Alle voorziene interne- en externe aardaansluitingen dienen op adequate wijze aangesloten te worden.
2. Na installatie, onderhouds- of reparatie werkzaamheden dienen alle beschermdeksels /kappen en aardingen om reden van veiligheid weer aangebracht te worden.
3. Voedingskabels dienen te voldoen aan de vereisten van de normen IEC 227 of IEC 245.
4. Alle bedrading dient geschikt te zijn voor gebruik bij een omgevings temperatuur boven 75°C.
5. Alle gebruikte kabelwartels dienen dusdanige inwendige afmetingen te hebben dat een adequate verankering van de kabel wordt verkregen.
6. Om een veilige werking van de apparatuur te waarborgen dient de voeding uitsluitend plaats te vinden via een meerpolige automatische zekering (min.10A) die alle spanningvoerende geleiders verbreekt indien een foutconditie optreedt. Deze automatische zekering mag ook voorzien zijn van een mechanisch bediende schakelaar. Bij het ontbreken van deze voorziening dient een andere als zodanig duidelijk aangegeven mogelijkheid aanwezig te zijn om de spanning van de apparatuur af te schakelen. Zekeringen en schakelaars dienen te voldoen aan een erkende standaard zoals IEC 947.
7. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder spanning voerende delen bevinden die gevaar op kunnen leveren. Deze beschermdeksels/ kappen mogen uitsluitend verwijderd worden door getraind personeel als de spanning is afgeschakeld.

8. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder hete oppervlakken of onderdelen bevinden. Bepaalde delen kunnen mogelijk na 45 min. nog te heet zijn om aan te raken.

9. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, dient men de bedieningshandleiding te raadplegen.

10. Alle grafische symbolen gebruikt bij dit produkt zijn volgens een of meer van de volgende standaarden: EN 61010-1, IEC 417 & ISO 3864.

TÄRKEÄÄ

Turvallisuusohje, jota on noudatettava tämän laitteen asentamisessa ja kaapeloinnissa.

Seuraavat ohjeet pätevät erityisesti EU:n jäsenvaltioissa. Niitä täytyy ehdottomasti noudattaa jotta täytettäisiin EU:n matalajännitedirektiivin (Low Voltage Directive) yhteensopivuus. Myös EU:hun kuulumattomien valtioiden tulee nou-dattaa tätä ohjetta, elleivät kansalliset standardit estä sitä.

1. Riittävät maadoituskytkennät on tehtävä kaikkiin maadoituspisteisiin, sisäisiin ja ulkoisiin.
2. Asennuksen ja vianetsinnän jälkeen on kaikki suojat ja suojamaat asennettava takaisin pai-koilleen. Maadoitusliittimen kunnollinen toiminta täytyy aina ylläpitää.
3. Jännitesyöttöjohtimien täytyy täyttää IEC227 ja IEC245 vaatimukset.
4. Kaikkien johdotuksien tulee toimia >75°C lämpötiloissa.
5. Kaikkien läpivientiholkkien sisähalkaisijan täytyy olla sellainen että kaapeli lukkiutuu kun-nolla kiinni.
6. Turvallisen toiminnan varmistamiseksi täytyy jännitesyöttö varustaa turvakytkimellä (min 10A), joka kytkee irti kaikki jännitesyöttöjohtimet vikatilanteessa. Suojaan täytyy myös sisältyä mekaaninen erotuskytkin. Jos ei, niin jännitesyöttö on pystyttävä katkaisemaan muilla keinoilla ja merkittävä siten että se tunnistetaan sellaiseksi. Turvakytkimien tai kat-kaisimien täytyy täyttää IEC947 standardin vaatimukset näkyvyydestä.
7. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla hengenvaarallisen suuruinen jännite. Suojaa ei saa poistaa jänniteen ollessa kytkettynä laitteeseen ja poistamisen saa suorittaa vain alan asian-tuntija.

8. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla kuuma pinta. Suojan saa poistaa vain alan asiantuntija kun jännite-syöttö on katkaistu. Tällainen pinta voi säilyä kosketuskuumana jopa 45 mi-nuuttia.

9. Mikäli laite tai kosketussuoja on merkitty tällä merkillä katso lisäohjeita käyt-töohjekirjasta.

10. Kaikki tässä tuotteessa käytetyt graafiset symbolit ovat yhdestä tai useammasta seuraavis-ta standardeista: EN61010-1, IEC417 & ISO3864.

IMPORTANT

Consignes de sécurité concernant le raccordement et l'installation de cet appareil.

Les consignes de sécurité ci-dessous s'adressent particulièrement à tous les états membres de la communauté européenne. Elles doivent être strictement appliquées afin de satisfaire aux directives concernant la basse tension. Les états non membres de la communauté européenne doivent également appliquer ces consignes sauf si elles sont en contradiction avec les standards locaux ou nationaux.

1. Un raccordement adéquat à la terre doit être effectuée à chaque borne de mise à la terre, interne et externe.
2. Après installation ou dépannage, tous les capots de protection et toutes les prises de terre doivent être remis en place, toutes les prises de terre doivent être respectées en permanence.
3. Les câbles d'alimentation électrique doivent être conformes aux normes IEC227 ou IEC245.
4. Tous les raccordements doivent pouvoir supporter une température ambiante supérieure à 75°C.
5. Tous les presse-étoupes utilisés doivent avoir un diamètre interne en rapport avec les câbles afin d'assurer un serrage correct sur ces derniers.
6. Afin de garantir la sécurité du fonctionnement de cet appareil, le raccordement à l'alimentation électrique doit être réalisé exclusivement au travers d'un disjoncteur (minimum 10A.) isolant tous les conducteurs en cas d'anomalie. Ce disjoncteur doit également pouvoir être actionné manuellement, de façon mécanique. Dans le cas contraire, un autre système doit être mis en place afin de pouvoir isoler l'appareil et doit être signalisé comme tel. Disjoncteurs et interrupteurs doivent être conformes à une norme reconnue telle IEC947.
7. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des tensions dangereuses sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent.

8. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des surfaces dangereusement chaudes sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent. Certaines surfaces peuvent rester chaudes jusqu'à 45 mn.

9. Lorsque les équipements ou les capots affichent le symbole suivant, se reporter au manuel d'instructions.

10. Tous les symboles graphiques utilisés dans ce produit sont conformes à un ou plusieurs des standards suivants: EN61010-1, IEC417 & ISO3864.

WICHTIG

Sicherheitshinweise für den Anschluß und die Installation dieser Geräte.

Die folgenden Sicherheitshinweise sind in allen Mitgliederstaaten der europäischen Gemeinschaft gültig. Sie müssen strickt eingehalten werden, um der Niederspannungsrichtlinie zu genügen. Nichtmitgliedsstaaten der europäischen Gemeinschaft sollten die national gültigen Normen und Richtlinien einhalten.

1. Alle intern und extern vorgesehenen Erdungen der Geräte müssen ausgeführt werden.
2. Nach Installation, Reparatur oder sonstigen Eingriffen in das Gerät müssen alle Sicherheitsabdeckungen und Erdungen wieder installiert werden. Die Funktion aller Erdverbindungen darf zu keinem Zeitpunkt gestört sein.
3. Die Netzspannungsversorgung muß den Anforderungen der IEC227 oder IEC245 genügen.
4. Alle Verdrahtungen sollten mindestens bis 75°C ihre Funktion dauerhaft erfüllen.
5. Alle Kabeldurchführungen und Kabelverschraubungen sollten in Ihrer Dimensionierung so gewählt werden, daß diese eine sichere Verkabelung des Gerätes ermöglichen.
6. Um eine sichere Funktion des Gerätes zu gewährleisten, muß die Spannungsversorgung über mindestens 10 A abgesichert sein. Im Fehlerfall muß dadurch gewährleistet sein, daß die Spannungsversorgung zum Gerät bzw. zu den Geräten unterbrochen wird. Ein mechanischer Schutzschalter kann in dieses System integriert werden. Falls eine derartige Vorrichtung nicht vorhanden ist, muß eine andere Möglichkeit zur Unterbrechung der Spannungszufuhr gewährleistet werden mit Hinweisen deutlich gekennzeichnet werden. Ein solcher Mechanismus zur Spannungsunterbrechung muß mit den Normen und Richtlinien für die allgemeine Installation von Elektrogeräten, wie zum Beispiel der IEC947, übereinstimmen.

7. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, die eine gefährliche (Netzspannung) Spannung führen. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen.

8. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, in bzw. unter denen heiße Teile vorhanden sind. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen. Bis 45 Minuten nach dem Unterbrechen der Netzzufuhr können derartig Teile noch über eine erhöhte Temperatur verfügen.

9. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, bei denen vor dem Eingriff die entsprechenden Kapitel im Handbuch sorgfältig durchgelesen werden müssen.
10. Alle in diesem Gerät verwendeten graphischen Symbole entspringen einem oder mehreren der nachfolgend aufgeführten Standards: EN61010-1, IEC417 & ISO3864.

IMPORTANTE

Norme di sicurezza per il cablaggio e l'installazione dello strumento.

Le seguenti norme di sicurezza si applicano specificatamente agli stati membri dell'Unione Europea, la cui stretta osservanza è richiesta per garantire conformità alla Direttiva del Basso Voltaggio. Esse si applicano anche agli stati non appartenenti all'Unione Europea, salvo quanto disposto dalle vigenti normative locali o nazionali.

1. Collegamenti di terra idonei devono essere eseguiti per tutti i punti di messa a terra interni ed esterni, dove previsti.
2. Dopo l'installazione o la localizzazione dei guasti, assicurarsi che tutti i coperchi di protezione siano stati collocati e le messa a terra siano collegate. L'integrità di ciscun morsetto di terra deve essere costantemente garantita.
3. I cavi di alimentazione della rete devono essere secondo disposizioni IEC227 o IEC245.
4. L'intero impianto elettrico deve essere adatto per uso in ambiente con temperature superiore a 75°C.
5. Le dimensioni di tutti i connettori dei cavi utilizzati devono essere tali da consentire un adeguato ancoraggio al cavo.
6. Per garantire un sicuro funzionamento dello strumento il collegamento alla rete di alimentazione principale dovrà essere eseguita tramite interruttore automatico (min.10A), in grado di disattivare tutti i conduttori di circuito in caso di guasto. Tale interruttore dovrà inoltre prevedere un sezionatore manuale o altro dispositivo di interruzione dell'alimentazione, chiaramente identificabile. Gli interruttori dovranno essere conformi agli standard riconosciuti, quali IEC947.
7. Il simbolo riportato sullo strumento o sui coperchi di protezione indica probabile presenza di elevati voltaggi. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento.

8. Il simbolo riportato sullo strumento o sui coperchi di protezione indica rischio di contatto con superfici ad alta temperatura. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento. Alcune superfici possono mantenere temperature elevate per oltre 45 minuti.

9. Se lo strumento o il coperchio di protezione riportano il simbolo, fare riferimento alle istruzioni del manuale Operatore.

10. Tutti i simboli grafici utilizzati in questo prodotto sono previsti da uno o più dei seguenti standard: EN61010-1, IEC417 e ISO3864.

VIKTIG

Sikkerhetsinstruks for tilkobling og installasjon av dette utstyret.

Følgende sikkerhetsinstruksjoner gjelder spesifikt alle EU medlemsland og land med i EØS-avtalen. Instruksjonene skal følges nøye slik at installasjonen blir i henhold til lavspenningsdirektivet. Den bør også følges i andre land, med mindre annet er spesifisert av lokale- eller nasjonale standarder.

1. Passende jordforbindelser må tilkobles alle jordingspunkter, interne og eksterne hvor disse forefinnes.
2. Etter installasjon eller feilsøking skal alle sikkerhetsdeksler og jordforbindelser reetableres. Jordingsforbindelsene må alltid holdes i god stand.
3. Kabler fra spenningsforsyning skal oppfylle kravene spesifisert i IEC227 eller IEC245.
4. Alle ledningsforbindelser skal være konstruert for en omgivelsestemperatur høyere en 750°C.
5. Alle kabelforskruvninger som benyttes skal ha en indre dimensjon slik at tilstrekkelig avlastning oppnåes.
6. For å oppnå sikker drift og betjening skal forbindelsen til spenningsforsyningen bare skje gjennom en strømbryter (minimum 10A) som vil bryte spenningsforsyningen til alle elektriske kretser ved en feilsituasjon. Strømbryteren kan også inneholde en mekanisk operert bryter for å isolere instrumentet fra spenningsforsyningen. Dersom det ikke er en mekanisk operert bryter installert, må det være en annen måte å isolere utstyret fra spenningsforsyningen, og denne måten må være tydelig merket. Kretsbrytere eller kontakter skal oppfylle kravene i en annerkjent standard av typen IEC947 eller tilsvarende.
7. Der hvor utstyr eller deksler er merket med symbol for farlig spenning, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjærnes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell.

8. Der hvor utstyr eller deksler er merket med symbol for meget varm overflate, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjærnes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell. Noen overflater kan være for varme til å berøres i opp til 45 minutter etter spenningsforsyning frakoblet.

9. Der hvor utstyret eller deksler er merket med symbol, vennligst referer til instruksjonsmanualen for instrukser.

10. Alle grafiske symboler brukt i dette produktet er fra en eller flere av følgende standarder: EN61010-1, IEC417 & ISO3864.

IMPORTANTE

Instruções de segurança para ligação e instalação deste aparelho.

As seguintes instruções de segurança aplicam-se especificamente a todos os estados membros da UE. Devem ser observadas rigidamente por forma a garantir o cumprimento da Directiva sobre Baixa Tensão. Relativamente aos estados que não pertençam à UE, deverão cumprir igualmente a referida directiva, exceptuando os casos em que a legislação local a tiver substituído.

1. Devem ser feitas ligações de terra apropriadas a todos os pontos de terra, internos ou externos.
2. Após a instalação ou eventual reparação, devem ser recolocadas todas as tampas de segurança e terras de protecção. Deve manter-se sempre a integridade de todos os terminais de terra.
3. Os cabos de alimentação eléctrica devem obedecer às exigências das normas IEC227 ou IEC245.
4. Os cabos e fios utilizados nas ligações eléctricas devem ser adequados para utilização a uma temperatura ambiente até 75ºC.
5. As dimensões internas dos bucins dos cabos devem ser adequadas a uma boa fixação dos cabos.
6. Para assegurar um funcionamento seguro deste equipamento, a ligação ao cabo de alimentação eléctrica deve ser feita através de um disjuntor (min. 10A) que desligará todos os condutores de circuitos durante uma avaria. O disjuntor poderá também conter um interruptor de isolamento accionado manualmente. Caso contrário, deverá ser instalado qualquer outro meio para desligar o equipamento da energia eléctrica, devendo ser assinalado convenientemente. Os disjuntores ou interruptores devem obedecer a uma norma reconhecida, tipo IEC947.
7. Sempre que o equipamento ou as tampas contiverem o símbolo, é provável a existência de tensões perigosas. Estas tampas só devem ser retiradas quando a energia eléctrica tiver sido desligada e por Pessoal da Assistência devidamente treinado.

8. Sempre que o equipamento ou as tampas contiverem o símbolo, há perigo de existência de superfícies quentes. Estas tampas só devem ser retiradas por Pessoal da Assistência devidamente treinado e depois de a energia eléctrica ter sido desligada. Algumas superfícies permanecem quentes até 45 minutos depois.

9. Sempre que o equipamento ou as tampas contiverem o símbolo, o Manual de Funcionamento deve ser consultado para obtenção das necessárias instruções.

10. Todos os símbolos gráficos utilizados neste produto baseiam-se em uma ou mais das seguintes normas: EN61010-1, IEC417 e ISO3864.

IMPORTANTE

Instrucciones de seguridad para el montaje y cableado de este aparato.

Las siguientes instrucciones de seguridad, son de aplicacion especifica a todos los miembros de la UE y se adjuntaran para cumplir la normativa europea de baja tension.

1. Se deben preveer conexiones a tierra del equipo, tanto externa como internamente, en aquellos terminales previstos al efecto.
2. Una vez finalizada las operaciones de mantenimiento del equipo, se deben volver a colocar las cubiertas de seguridad aasi como los terminales de tierra. Se debe comprobar la integridad de cada terminal.
3. Los cables de alimentacion electrica cumpliran con las normas IEC 227 o IEC 245.
4. Todo el cableado sera adecuado para una temperatura ambiental de 75ºC.
5. Todos los prensaestopas seran adecuados para una fijacion adecuada de los cables.
6. Para un manejo seguro del equipo, la alimentacion electrica se realizara a traves de un interruptor magnetotermico (min 10 A), el cual desconectara la alimentacion electrica al equipo en todas sus fases durante un fallo. Los interruptores estaran de acuerdo a la norma IEC 947 u otra de reconocido prestigio.
7. Cuando las tapas o el equipo lleve impreso el simbolo de tension electrica peligrosa, dicho alojamiento solamente se abrira una vez que se haya interrumpido la alimentacion electrica al equipo asimismo la intervencion sera llevada a cabo por personal entrenado para estas labores.

8. Cuando las tapas o el equipo lleve impreso el simbolo, hay superficies con alta temperatura, por tanto se abrira una vez que se haya interrumpido la alimentacion electrica al equipo por personal entrenado para estas labores, y al menos se esperara unos 45 minutos para enfriar las superficies calientes.

9. Cuando el equipo o la tapa lleve impreso el simbolo, se consultara el manual de instrucciones.

10. Todos los simbolos graficos usados en esta hoja, estan de acuerdo a las siguientes normas EN61010-1, IEC417 & ISO 3864.

VIKTIGT

Säkerhetsföreskrifter för kablage och installation av denna apparat.

Följande säkerhetsföreskrifter är tillämpliga för samtliga EU-medlemsländer. De skall följas i varje avseende för att överensstämma med Lågspännings direktivet. Icke EU medlemsländer skall också följa nedanstående punkter, såvida de inte övergrips av lokala eller nationella föreskrifter.

1. Tillämplig jordkontakt skall utföras till alla jordade punkter, såväl internt som externt där så erfordras.
2. Efter installation eller felsökning skall samtliga säkerhetshöljen och säkerhetsjord återplaceras. Samtliga jordterminaler måste hållas obrutna hela tiden.
3. Matningsspänningens kabel måste överensstämma med föreskrifterna i IEC227 eller IEC245.
4. Allt kablage skall vara lämpligt för användning i en omgivningstemperatur högre än 75ºC.
5. Alla kabelförskruvningar som används skall ha inre dimensioner som motsvarar adekvat kabelförankring.
6. För att säkerställa säker drift av denna utrustning skall anslutning till huvudströmmen endast göras genom en säkring (min 10A) som skall frånkoppla alla strömförande kretsar när något fel uppstår. Säkringen kan även ha en mekanisk frånskiljare. Om så inte är fallet, måste ett annat förfarande för att frånskilja utrustningen från strömförsörjning tillhandahållas och klart framgå genom markering. Säkring eller omkopplare måste överensstämma med en gällande standard såsom t ex IEC947.
7. Där utrustning eller hölje är markerad med vidstående symbol föreliggerisk för livsfarlig spänning i närheten. Dessa höljen får endast avlägsnas när strömmen ej är ansluten till utrustningen - och då endast av utbildad servicepersonal.

8. När utrustning eller hölje är markerad med vidstående symbol föreligger risk för brännskada vid kontakt med uppvärmd yta. Dessa höljen får endast avlägsnas av utbildad servicepersonal, när strömmen kopplats från utrustningen. Vissa ytor kan vara mycket varma att vidröra även upp till 45 minuter efter avstängning av strömmen.

9. När utrustning eller hölje markerats med vidstående symbol bör instruktionsmanualen studeras för information.

10. Samtliga grafiska symboler som förekommer i denna produkt finns angivna i en eller flera av följande föreskrifter:- EN61010-1, IEC417 & ISO3864.

ΠΡΟΣΟΧΗ

Οδηγίες ασφαλείας για την καλωδίωση και εγκατάσταση της συσκευής.

Οι ακόλουθες οδηγίες ασφαλείας εφαρμόζονται ειδικά σε όλες τις χώρες μέλη της Ευρωπαϊκής Κοινότητας. Θα πρέπει να ακολουθούνται αυστηρά ώστε να εξασφαλιστεί η συμβατότητα με τις οδηγίες για τη Χαμηλή Τάση. Χώρες που δεν είναι μέλη της Ευρωπαϊκής Κοινότητας θα πρέπει επίσης να ακολουθούν τις οδηγίες εκτός εάν αντικαθίστανται από τα Τοπικά ή Εθνικά Πρότυπα.

1. Επαρκείς συνδέσεις γείωσης θα πρέπει να γίνονται σε όλα τα σημεία γείωσης, εσωτερικά και εξωτερικά όπου υπάρχουν.

2. Μετά την εγκατάσταση ή την εκσφαλμάτωση όλα τα καλύματα ασφαλείας και οι γειώσεις ασφαλείας πρέπει να επανεγκαθίστανται. Η καλή κατάσταση όλων των ακροδεκτών γείωσης πρέπει να ελέγχεται και να συντηρείται διαρκώς.

3. Τα καλώδια τροφοδοσίας πρέπει να πληρούν τις απαιτήσεις των IEC227 ή IEC245.

4. Ολες οι καλωδιώσεις θα πρέπει είναι κατάλληλες για χρήση σε ατμοσφαιρική θερμοκρασία χώρου υψηλότερη από 75°C.

5. Ολοι οι στυπιοθλίπτες θα πρέπει να είναι τέτοιων εσωτερικών διαστάσεων ώστε να παρέχουν επαρκή στερέωση των καλωδίων.

6. Για τη διασφάλιση ασφαλούς λειτουργίας της σύνδεσης τροφοδοσίας αυτής της συσκευής θα πρέπει να γίνεται μόνο μέσω ασφαλειοδιακόπτη (ελάχιστο 10A) ο οποίος θα αποσυνδέει όλους του ηλεκτροφόρους αγωγούς στη διάρκεια κατάστασης σφάλματος.
   Ο ασφαλειοδιακόπτης μπορεί επίσης να περιλαμβάνει μηχανικό διακόπτη απομόνωσης. Εάν δεν περιλαμβάνει, τότε άλλα μέσα αποσύνδεσης της συσκευής από την τροφοδοσία πρέπει να παροχηθούν και σαφώς να σημανθούν σαν τέτοια. Οι ασφαλειοδιακόπτες ή διακόπτες πρέπει να συμφωνούν με αναγνωρισμένα πρότυπα όπως το IEC947.

7. Οπου συσκευές ή καλύματα είναι σημασμένα με το σύμβολο επικίνδυνες τάσεις ενυπάρχουν κάτω από αυτά.
   Αυτά τα καλύματα θα πρέπει να αφαιρούνται μόνο όταν έχει αφαιρεθεί η τροφοδοσία από τη συσκευή και τότε μόνο από ειδικευμένο τεχνικό προσωπικό.

8. Οπου συσκευές ή καλύματα είναι σημασμένα με το σύμβολο υπάρχει κίνδυνος από καυτές επιφάνειες κάτω από αυτά.
   Αυτά τα καλύματα θα πρέπει να αφαιρούνται μόνο από ειδικευμένο τεχνικό προσωπικό, όταν η τροφοδοσία έχει αφαιρεθεί από από τη συσκευή. Τέτοιες επιφάνειες μπορούν να παραμείνουν ζεστές στην αφή έως και 45 λεπτά αργότερα.

9. Οπου συσκευές ή καλύματα είναι σημασμένα με το σύμβολο αναφερθείται στις οδηγίες χρήσης της συσκευής.

10. Ολα τα γραφικά σύμβολα που χρησιμοποιούνται σε αυτό το προϊόν είναι από ένα ή περισσότερα από τα έχης πρότυπα: **EN61010-1**, **IEC417** και **ISO3864**.

CERAMIC FIBER PRODUCTS MATERIAL SAFETY DATA SHEET

JULY 1, 1996

SECTION I. IDENTIFICATION

PRODUCT NAME
Ceramic Fiber Heaters, Molded Insulation Modules and Ceramic Fiber Radiant Heater Panels.

CHEMICAL FAMILY
Vitreous Aluminosilicate Fibers with Silicon Dioxide.

CHEMICAL NAME
N.A.

CHEMICAL FORMULA
N.A.

MANUFACTURER'S NAME AND ADDRESS
Watlow Columbia
2101 Pennsylvania Drive
Columbia, MO 65202
573-814-1300, ext. 5170
573-474-9402

HEALTH HAZARD SUMMARY WARNING

- Possible cancer hazard based on tests with laboratory animals.
- May be irritating to skin, eyes and respiratory tract.
- May be harmful if inhaled.
- Cristobalite (crystalline silica) formed at high temperatures (above 1800ºF) can cause severe respiratory disease.

SECTION II. PHYSICAL DATA

APPEARANCE AND ODOR
Cream to white colored fiber shapes. With or without optional white to gray granular surface coating and/or optional black surface coating.

SPECIFIC WEIGHT: 12-25 LB./CUBIC FOOT

BOILING POINT: N.A.

VOLATILES (% BY WT.): N.A.

WATER SOLUBILITY: N.A.

SECTION III. HAZARDOUS INGREDIENTS

MATERIAL, QUANTITY, AND THRESHOLD/EXPOSURE LIMIT VALUES

Aluminosilicate (vitreous) 99+ %	1 fiber/cc TWA
CAS. No. 142844-00-06	10 fibers/cc CL
Zirconium Silicate	0-10% 5 mg/cubic meter (TLV)
Black Surface Coating**	0 - 1% 5 mg/cubic meter (TLV)
Armorphous Silica/Silicon Dioxide	0-10% 20 mppcf (6 mg/cubic meter) PEL (OSHA 1978) 3 gm/cubic meter (Respirable dust): 10 mg/cubic meter, Intended TLV (ACGIH 1984-85)

**Composition is a trade secret.

SECTION IV. FIRE AND EXPLOSION DATA

FLASH POINT: NONE

FLAMMABILITY LIMITS: N.A.

EXTINGUISHING MEDIA
Use extinguishing agent suitable for type of surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS / SPECIAL FIRE FIGHTING PROCEDURES
N.A.

SECTION V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
(See Section III)

EFFECTS OF OVER EXPOSURE

- EYE - Avoid contact with eyes. Slightly to moderately irritating. Abrasive action may cause damage to outer surface of eye.
- INHALATION - May cause respiratory tract irritation. Repeated or prolonged breathing of particles of respirable size may cause inflammation of the lung leading to chest pain, difficult breathing, coughing and possible fibrotic change in the lung (Pneumoconiosis). Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial hyper-reactivity and chronic bronchial or lung disease.
- INGESTION - May cause gastrointestinal disturbances. Symptoms may include irritation and nausea, vomiting and diarrhea.
- SKIN - Slightly to moderate irritating. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

EXPOSURE TO USED CERAMIC FIBER PRODUCT
Product which has been in service at elevated temperatures (greater than 1800ºF/982ºC) may undergo partial conversion to cristobalite, a form of crystalline silica which can cause severe respiratory disease (Pneumoconiosis). The amount of cristobalite present will depend on the temperature and length of time in service. (See Section IX for permissible exposure levels).

SPECIAL TOXIC EFFECTS
The existing toxicology and epidemiology data bases for RCF's are still preliminary. Information will be updated as studies are completed and reviewed. The following is a review of the results to date:

EPIDEMIOLOGY
At this time there are no known published reports demonstrating negative health outcomes of workers exposed to refractory ceramic fiber (RCF). Epidemiologic investigations of RCF production workers are ongoing.

1) There is no evidence of any fibrotic lung disease (interstitial fibrosis) whatsoever on x-ray.
2) There is no evidence of any lung disease among those employees exposed to RCF that had never smoked.

3) A statistical "trend" was observed in the exposed population between the duration of exposure to RCF and a decrease in some measures of pulmonary function. These observations are clinically insignificant. In other words, if these observations were made on an individual employee, the results would be interpreted as being within the normal range.

4) Pleural plaques (thickening along the chest wall) have been observed in a small number of employees who had a long duration of employment. There are several occupational and non-occupational causes for pleural plaque. It should be noted that plaques are not "pre-cancer" nor are they associated with any measurable effect on lung function.

TOXICOLOGY

A number of studies on the health effects of inhalation exposure of rats and hamsters are available. Rats were exposed to RCF in a series of life-time nose-only inhalation studies. The animals were exposed to 30, 16, 9, and 3 mg/m^3, which corresponds with approximately 200, 150, 75, and 25 fibers/cc.

Animals exposed to 30 and 16 mg/m^3 were observed to have developed a pleural and parenchymal fibroses; animals exposed to 9 mg/m^3 had developed a mild parenchymal fibrosis; animals exposed to the lowest dose were found to have the response typically observed any time a material is inhaled into the deep lung. While a statistically significant increase in lung tumors was observed following exposure to the highest dose, there was no excess lung cancers at the other doses. Two rats exposed to 30 mg/m^3 and one rat exposed to 9 mg/m^3 developed masotheliomas.

The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made vitreous fibers (including ceramic fiber, glasswool, rockwool, and slagwool) in 1987. IARC classified ceramic fiber, fibrous glasswool and mineral wool (rockwool and slagwool) as possible human carcinogens (Group 2B).

EMERGENCY FIRST AID PROCEDURES

- EYE CONTACT - Flush eyes immediately with large amounts of water for approximately 15 minutes. Eye lids should be held away from the eyeball to insure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.
- INHALATION - Remove person from source of exposure and move to fresh air. Some people may be sensitive to fiber induced irritation of the respiratory tract. If symptoms such as shortness of breath, coughing, wheezing or chest pain develop, seek medical attention. If person experiences continued breathing difficulties, administer oxygen until medical assistance can be rendered.
- INGESTION - Do not induce vomiting. Get medical attention if irritation persists.
- SKIN CONTACT - Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful. Get medical attention if irritation persists.

SECTION VI. REACTIVITY DATA

STABILITY/CONDITIONS TO AVOID
Stable under normal conditions of use.

HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID
N.A.

INCOMPATIBILITY/MATERIALS TO AVOID
Incompatible with hydrofluoric acid and concentrated alkali.

HAZARDOUS DECOMPOSITION PRODUCTS
N.A.

SECTION VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
Where possible, use vacuum suction with HEPA filters to clean up spilled material. Use dust suppressant where sweeping if necessary. Avoid clean up procedure which may result in water pollution. (Observe Special Protection Information Section VIII.)

WASTE DISPOSAL METHODS
The transportation, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, State, and Local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION
Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. (See Section IX for suitable equipment).

Pending the results of long term health effects studies, engineering control of airborne fibers to the lowest levels attainable is advised.

VENTILATION
Ventilation should be used whenever possible to control or reduce airborne concentrations of fiber and dust. Carbon monoxide, carbon dioxide, oxides of nitrogen, reactive hydrocarbons and a small amount of formaldehyde may accompany binder burn-off during first heat. Use adequate ventilation or other precautions to eliminate vapors resulting from binder burn-off. Exposure to burn-off fumes may cause respiratory tract irritation, bronchial hyper-reactivity and asthmatic response.

SKIN PROTECTION
Wear gloves, hats and full body clothing to prevent skin contact. Use separate lockers for work clothes to prevent fiber transfer to street clothes. Wash work clothes separately from other clothing and rinse washing machine thoroughly after use.

EYE PROTECTION
Wear safety glasses or chemical worker's goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SECTION IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

General cleanliness should be followed.

The Toxicology data indicate that ceramic fiber should be handled with caution. The handling practices described in this MSDS must be strictly followed. In particular, when handling refractory ceramic fiber in any application, special caution should be taken to avoid unnecessary cutting and tearing of the material to minimize generation of airborne dust.

It is recommended that full body clothing be worn to reduce the potential for skin irritation. Washable or disposable clothing may be used. Do not take unwashed work clothing home. Work clothes should be washed separately from other clothing. Rinse washing machine thoroughly after use. If clothing is to be laundered by someone else, inform launderer of proper procedure. Work clothes and street clothes should be kept separate to prevent contamination.

Product which has been in service at elevated temperatures (greater than 1800ºF/982ºC) may undergo partial conversion to cristobalite, a form of crystalline silica. This reaction occurs at the furnace lining hot face. As a consequence, this material becomes more friable; special caution must be taken to minimize generation of airborne dust. The amount of cristobalite present will depend on the temperature and length in service.

IARC has recently reviewed the animal, human, and other relevant experimental data on silica in order to critically evaluate and classify the cancer causing potential. Based on its review, IARC classified crystalline silica as a group 2A carcinogen (probable human carcinogen).

The OSHA permissible exposure limit (PEL for cristobalite is 0.05 mg/m^3 (respirable dust). The ACGIH threshold limit value (TLV) for cristobalite is 0.05 mg/m^3 (respirable dust) (ACGIH 1991-92). Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. The minimum respiratory protection recommended for given airborne fiber or cristobalite concentrations are:

CONCENTRATION

Concentration	Personal Protective Equipment
0-1 fiber/cc or 0-0.05 mg/m^3 cristobalite (the OSHA PEL)	Optional disposable dust respirator (e.g. 3M 9970 or equivalent).
Up to 5 fibers/cc or up to 10 times the OSHA PEL for cristobalite	Half face, air-purifying respirator equipped with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 6000 series with 2040 filter or equivalent).
Up to 25 fibers/cc or 50 times the OSHA PEL for cristobalite (2.5 mg/m^3)	Full face, air-purifying respirator with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 7800S with 7255 filters or equivalent) or powered air-purifying respirator (PARR) equipped with HEPA filter cartridges (e.g. 3M W3265S with W3267 filters or equivalent).
Greater than 25 fibers/cc or 50 times the OSHA PEL for cristobalite (2.5 mg/m^3)	Full face, positive pressure supplied air respirator (e.g. 3M 7800S with W9435 hose & W3196 low pressure regulator kit connected to clean air supply or equivalent).

If airborne fiber or cristobalite concentrations are not known, as minimum protection, use NIOSH/MSHA approved half face, air-purifying respirator with HEPA filter cartridges.

Insulation surface should be lightly sprayed with water before removal to suppress airborne dust. As water evaporates during removal, additional water should be sprayed on surfaces as needed. Only enough water should be sprayed to suppress dust so that water does not run onto the floor of the work area. To aid the wetting process, a surfactant can be used.

After RCF removal is completed, dust-suppressing cleaning methods, such as wet sweeping or vacuuming, should be used to clean the work area. If dry vacuuming is used, the vacuum must be equipped with HEPA filter. Air blowing or dry sweeping should not be used. Dust-suppressing components can be used to clean up light dust.

Product packaging may contain product residue. Do not reuse except to reship or return Ceramic Fiber products to the factory.

HIGH PRESSURE GAS CYLINDERS

GENERAL PRECAUTIONS FOR HANDLING AND STORING HIGH PRESSURE GAS CYLINDERS

Edited from selected paragraphs of the Compressed Gas Association's "Handbook of Compressed Gases" published in 1981

Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, Virginia 22202
Used by Permission

1. Never drop cylinders or permit them to strike each other violently.
2. Cylinders may be stored in the open, but in such cases, should be protected against extremes of weather and, to prevent rusting, from the dampness of the ground. Cylinders should be stored in the shade when located in areas where extreme temperatures are prevalent.
3. The valve protection cap should be left on each cylinder until it has been secured against a wall or bench, or placed in a cylinder stand, and is ready to be used.
4. Avoid dragging, rolling, or sliding cylinders, even for short distance; they should be moved by using a suitable hand-truck.
5. Never tamper with safety devices in valves or cylinders.
6. Do not store full and empty cylinders together. Serious suckback can occur when an empty cylinder is attached to a pressurized system.
7. No part of cylinder should be subjected to a temperature higher than 52°C (125°F). A flame should never be permitted to come in contact with any part of a compressed gas cylinder.
8. Do not place cylinders where they may become part of an electric circuit. When electric arc welding, precautions must be taken to prevent striking an arc against the cylinder.

Appendix B SPA with HART Alarm

Overview . . . . . **page B-1**
Description . . . . . **page B-1**
Installation . . . . . **page B-2**
Setup . . . . . **page B-2**

OVERVIEW

This section describes the SPA with HART Alarm option for the OCX 8800.

DESCRIPTION

The Moore Industries SPA with HART Alarm, Figure B-1, is a 4-wire (line or mains powered), site-programmable, digital process alarm. It connects to a standard HART field device, and provides up to four, fully configurable, contact-closure outputs based on readings of the HART digital data. The four OCX 8800 alarm outputs recognized by the SPA are Low O_2, High COe, Calibration Status, and OCX Unit Failure.

Figure B-1. SPA with HART Alarm

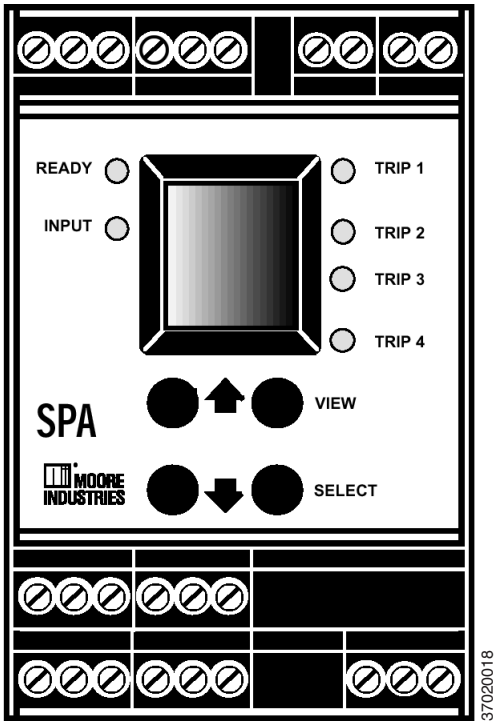
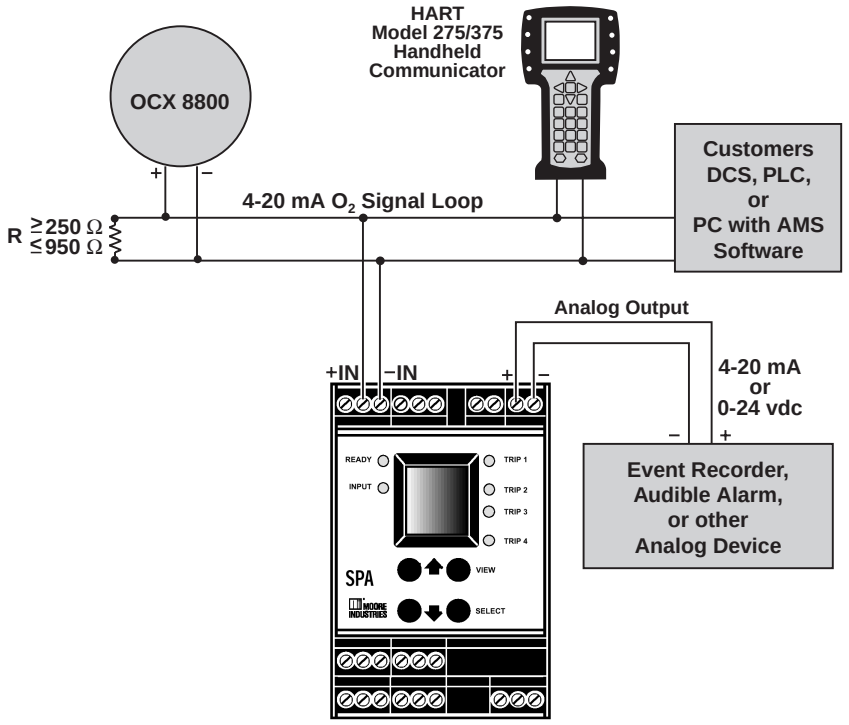


Figure B-2. OCX 8800 and SPA Interface Connections



INSTALLATION

Refer to Figure B-2 for the typical interface connections for the OCX 8800 and the SPA with HART alarm. Refer to the Moore Industries SPA user's manual for additional information concerning SPA installation, setup, and operation.

SETUP

Setup of the SPA for communication with the OCX 8800 includes setting internal jumpers and dip switches and configuring the SPA operating parameters via a menu-driven selection and calibration procedure.

Jumper and Switch Settings

SPA jumper and switch settings are shown in Figure B-3. If the SPA with HART was factory-configured by Emerson Process Management for operation with your OCX 8800, jumper and switch setting adjustments are not required. However, you may use the following procedure to verify that the jumper and switch settings are correct. Adjust or verify jumper and switch settings as follows:

⚠CAUTION

Electrostatic discharge (ESD) protection is required to avoid damage to the SPA electronic circuits.

1. Refer to Figure B-3. Turn the SPA over and slide the access cover out. Before changing any jumper or switch position, take adequate precautions to avoid an electrostatic discharge.

Figure B-3. SPA Jumper and Dip Switch Settings

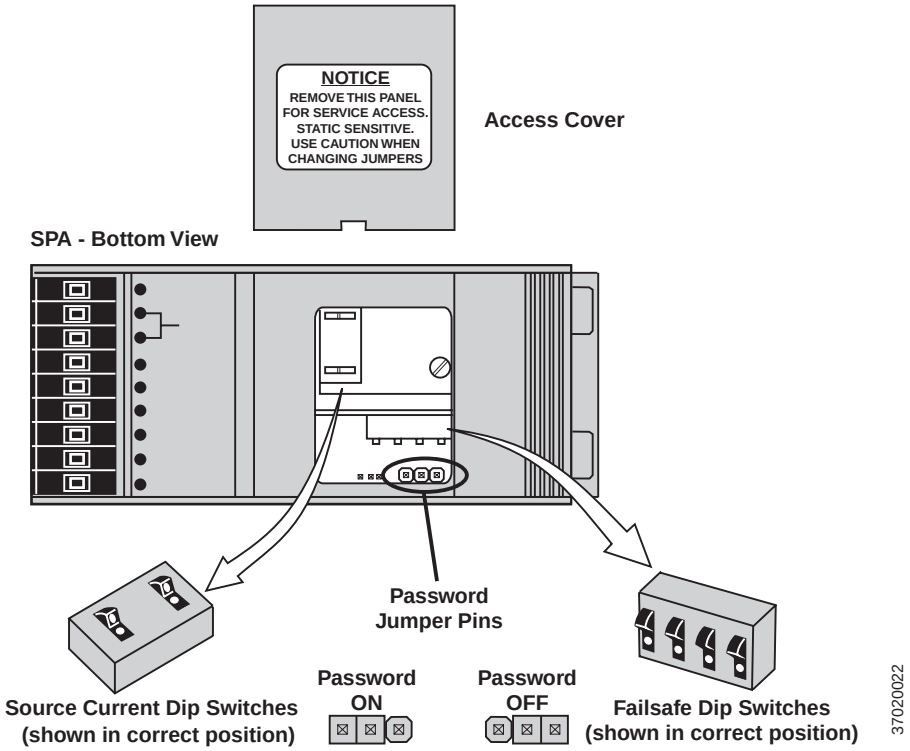
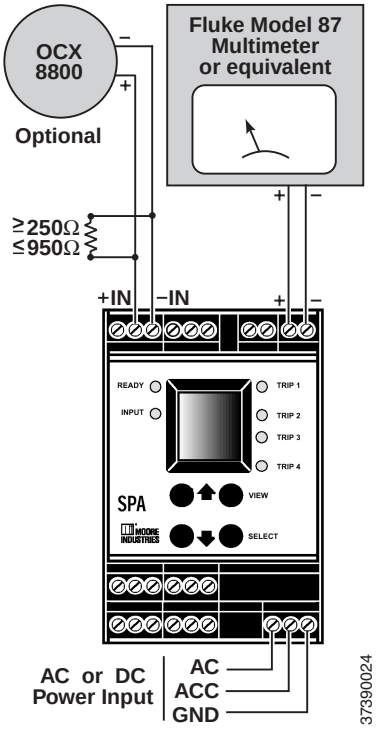

NOTICE
REMOVE THIS PANEL FOR SERVICE ACCESS. STATIC SENSITIVE. USE CAUTION WHEN CHANGING JUMPERS
Access Cover
SPA - Bottom View
Password Jumper Pins
Source Current Dip Switches (shown in correct position)
Password ON
Password OFF
Failsafe Dip Switches (shown in correct position)
37020022

Figure B-4. SPA Setup for Calibration



2. Verify that the Password Jumper is set to the OFF position. If the jumper is in the ON position, reposition the jumper.
3. Check the position of the Failsafe Dip Switches. Position the dip switches as shown in Figure B-3.
4. Check the position of the Source Current Dip Switches. Position the dip switches as shown in Figure B-3.
5. Reinstall the SPA access cover.

Configuration/Calibration

Prior to operation, the SPA operating parameters must be configured via a menu-driven setup procedure. At the end of the configuration procedure, the SPA analog output signal is calibrated to insure valid communications.

1. See Figure B-4. Connect a calibrated ammeter (Fluke Model 87 or equivalent, accurate to ±0.025%) to the SPA analog output terminals. Observe polarity.
2. Connect a 90 to 260 VAC or 22 to 300 VDC power source to the SPA power terminals. When connecting an AC power source, use the AC and ACC (AC Common) terminals. For a DC source, use the AC and Ground terminals.
3. If desired, you can connect the 4 to 20 mA O2 signal wires from the OCX 8800 analog output terminal block to the SPA Input terminals. (The OCX must be operational to transmit the O2 signal. Observe polarity.)

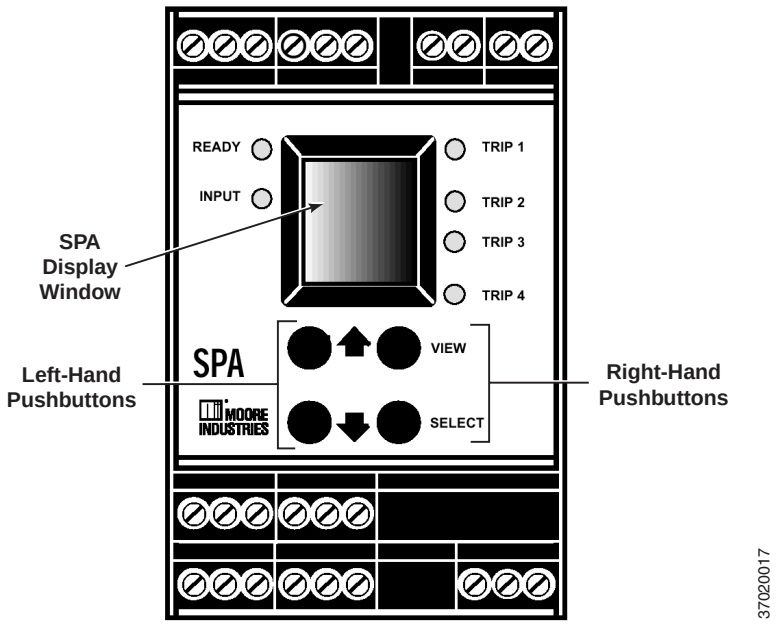
NOTE
The O_2 signal connection is not required for SPA configuration or calibration. The OCX interface will allow you to observe the O_2 signal level when the SPA configuration procedure is completed.

4. Observe the front panel of the SPA, Figure B-5:
   a. A process value display in the SPA display window indicates that the SPA is operational. Four pushbuttons are located below the display window.
   b. Pressing a left-hand pushbutton scrolls up (↑) or down (↓) through the SPA command menu, a submenu, or parameter values list.
   c. Pressing the VIEW pushbutton displays rail limits and alarm relay configurations. There are five sequential displays in the VIEW mode. While in the VIEW mode, the up (↑), down (↓), and SELECT pushbuttons are disabled.

NOTE
In the VIEW mode, you can scroll through and display the output zero and full scale settings and the alarm relay trip points and configurations.

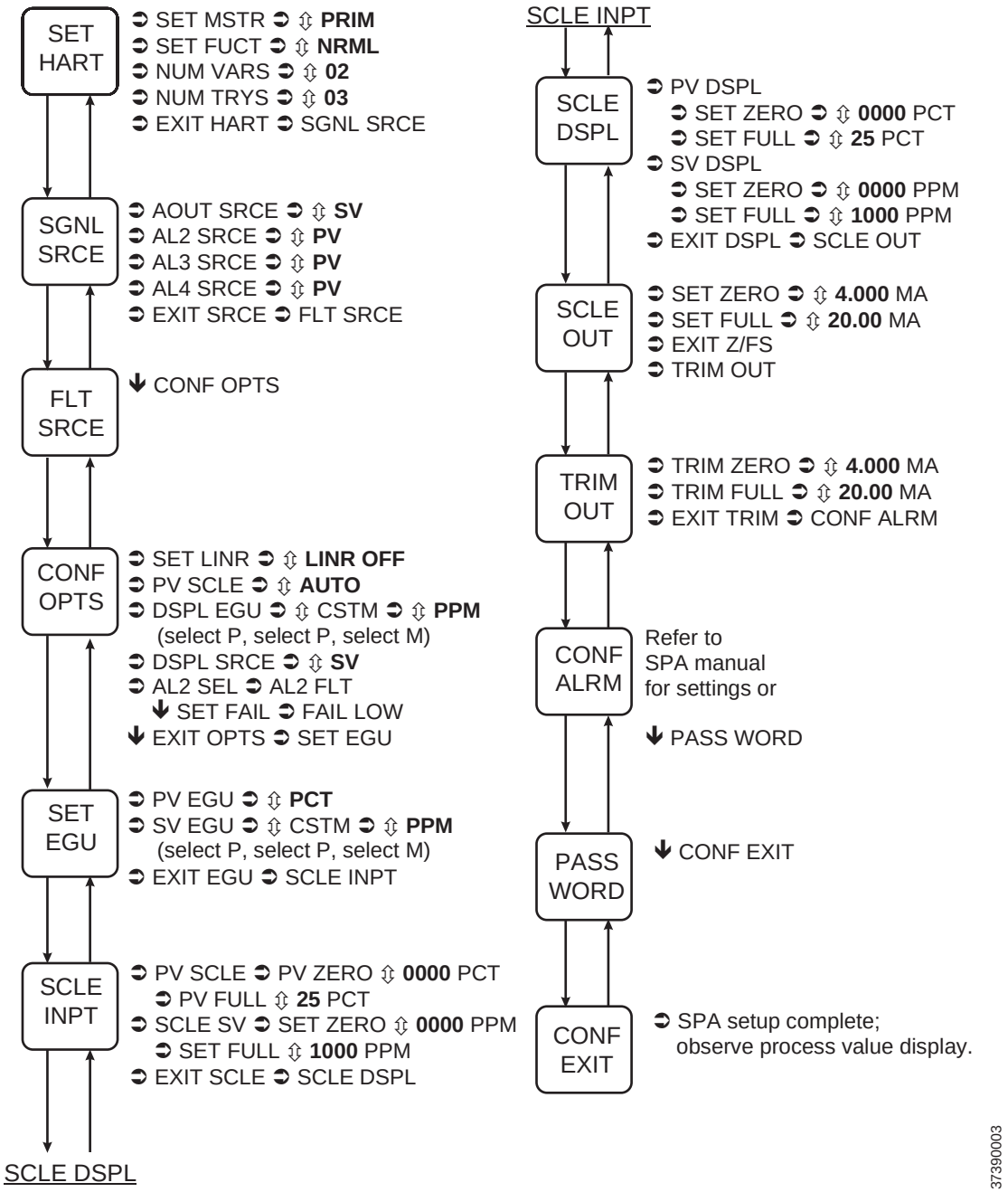
   d. Pressing the SELECT pushbutton selects the displayed menu or submenu command or selects a displayed parameter variable.

Figure B-5. SPA Front Panel



5. Figure B-6 shows the SPA menu, submenus, and parameter values that must be selected to configure the SPA for use with the OCX 8800. Use the following instructions and selections shown to properly configure the SPA.
   a. Press the SELECT pushbutton. Observe the display window on the SPA front panel. The display window should read SET HART.
   b. See the SET HART command in Figure B-6. To the right of the command window is the SET HART submenu and related parameter values that must be selected via the front panel pushbuttons on the SPA.
   c. In the submenu views shown:
      ↓ means press the down pushbutton.
      ↑ means press the up pushbutton.
      ➲ means press the SELECT pushbutton one time.
      ⇳ means press the ↓ or ↑ pushbutton until the desired parameter value is shown in the SPA window.
   d. Proceed through the SPA menu, selecting the menu commands and parameter values indicated. After completing the sequence in the first column, go to the top of the second column and continue.
   e. To exit the menu, repeatedly press SELECT to display any main menu command. Then, press ↓ or ↑ until CONF EXIT is displayed. Select CONF EXIT.
   f. Detailed instructions concerning the configuration menu and the submenu structure for each main command are provided in the SPA user's manual.

Figure B-6. SPA Configuration Menu
for OCX 8800 Communication


SET HART
➲ SET MSTR ➲ ⇳ **PRIM**
➲ SET FUCT ➲ ⇳ **NRML**
➲ NUM VARS ➲ ⇳ **02**
➲ NUM TRYS ➲ ⇳ **03**
➲ EXIT HART ➲ SGNL SRCE
SGNL SRCE
➲ AOUT SRCE ➲ ⇳ **SV**
➲ AL2 SRCE ➲ ⇳ **PV**
➲ AL3 SRCE ➲ ⇳ **PV**
➲ AL4 SRCE ➲ ⇳ **PV**
➲ EXIT SRCE ➲ FLT SRCE
FLT SRCE
➲ CONF OPTS
CONF OPTS
➲ SET LINR ➲ ⇳ **LINR OFF**
➲ PV SCLE ➲ ⇳ **AUTO**
➲ DSPL EGU ➲ ⇳ CSTM ➲ ⇳ **PPM**
(select P, select P, select M)
➲ DSPL SRCE ➲ ⇳ **SV**
➲ AL2 SEL ➲ AL2 FLT
➲ SET FAIL ➲ FAIL LOW
➲ EXIT OPTS ➲ SET EGU
SET EGU
➲ PV EGU ➲ ⇳ **PCT**
➲ SV EGU ➲ ⇳ CSTM ➲ ⇳ **PPM**
(select P, select P, select M)
➲ EXIT EGU ➲ SCLE INPT
SCLE INPT
➲ PV SCLE ➲ PV ZERO ⇳ **0000** PCT
➲ PV FULL ⇳ **25** PCT
➲ SCLE SV ➲ SET ZERO ⇳ **0000** PPM
➲ SET FULL ⇳ **1000** PPM
➲ EXIT SCLE ➲ SCLE DSPL
SCLE DSPL
SCLE INPT
SCLE DSPL
➲ PV DSPL
➲ SET ZERO ➲ ⇳ **0000** PCT
➲ SET FULL ➲ ⇳ **25** PCT
➲ SV DSPL
➲ SET ZERO ➲ ⇳ **0000** PPM
➲ SET FULL ➲ ⇳ **1000** PPM
➲ EXIT DSPL ➲ SCLE OUT
SCLE OUT
➲ SET ZERO ➲ ⇳ **4.000** MA
➲ SET FULL ➲ ⇳ **20.00** MA
➲ EXIT Z/FS
➲ TRIM OUT
TRIM OUT
➲ TRIM ZERO ➲ ⇳ **4.000** MA
➲ TRIM FULL ➲ ⇳ **20.00** MA
➲ EXIT TRIM ➲ CONF ALRM
CONF ALRM
Refer to
SPA manual
for settings or
➲ PASS WORD
PASS WORD
➲ CONF EXIT
CONF EXIT
➲ SPA setup complete;
observe process value display.
37390003

Appendix C Return of Materials

RETURNING MATERIAL

If factory repair of defective equipment is required, proceed as follows:

1. Secure a return authorization number from a Rosemount Analytical sales office or representative before returning the equipment. Equipment must be returned with complete identification in accordance with Rosemount Analytical instructions or it will not be accepted.

   In no event will Emerson Process Management be responsible for equipment returned without proper authorization and identification.
2. Carefully pack defective unit in a sturdy box with sufficient shock absorbing material to ensure that no additional damage will occur during shipping.
3. In a cover letter, describe completely:
   a. The symptoms from which it was determined that the equipment is faulty.
   b. The environment in which the equipment has been operating (housing, weather, vibration, dust, etc.).
   c. Site from which equipment was removed.
   d. Whether warranty or nonwarranty service is requested.
   e. Complete shipping instructions for return of equipment.
   f. Reference the return authorization number.
4. Enclose a cover letter and purchase order and ship the defective equipment according to instructions provided in Rosemount Analytical Return Authorization, prepaid, to:

   Rosemount Analytical Inc.
   RMR Department
   Daniel Headquarters
   11100 Britmore Park Drive
   Houston, TX 77041

If warranty service is requested, the defective unit will be carefully inspected and tested at the factory. If failure was due to conditions listed in the standard Rosemount Analytical warranty, the defective unit will be repaired or replaced at Rosemount Analytical's option, and an operating unit will be returned to the customer in accordance with shipping instructions furnished in the cover letter.

For equipment no longer under warranty, the equipment will be repaired at the factory and returned as directed by the purchase order and shipping instructions.

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WARRANTY

Rosemount Analytical warrants that the equipment manufactured and sold by it will, upon shipment, be free of defects in workmanship or material. Should any failure to conform to this warranty become apparent during a period of one year after the date of shipment, Rosemount Analytical shall, upon prompt written notice from the purchaser, correct such nonconformity by repair or replacement, F.O.B. factory of the defective part or parts. Correction in the manner provided above shall constitute a fulfillment of all liabilities of Rosemount Analytical with respect to the quality of the equipment.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY WHETHER WRITTEN, ORAL, OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OF FITNESS FOR PURPOSE).

The remedy(ies) provided above shall be purchaser's sole remedy(ies) for any failure of Rosemount Analytical to comply with the warranty provisions, whether claims by the purchaser are based in contract or in tort (including negligence).

Rosemount Analytical does not warrant equipment against normal deterioration due to environment. Factors such as corrosive gases and solid particulates can be detrimental and can create the need for repair or replacement as part of normal wear and tear during the warranty period.

Equipment supplied by Rosemount Analytical Inc. but not manufactured by it will be subject to the same warranty as is extended to Rosemount Analytical by the original manufacturer.

At the time of installation it is important that the required services are supplied to the system and that the electronic controller is set up at least to the point where it is controlling the sensor heater. This will ensure, that should there be a delay between installation and full commissioning that the sensor being supplied with ac power and reference air will not be subjected to component deterioration.

OCX 8800

Instruction Manual
IM-106-880 Original Issue
February 2005

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